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A CABINET FOR OLD CHINA.

BY F. JERMAN.

INTRODUCTION — SIZES OF MATERIAL — WOOD — CONSTRUCTION — DOORS AND FITTINGS — PAINTING — CONCLUSION.

MOST of the readers of WORK, I daresay, have hobbies. Some go in for collecting stamps or birds' eggs, or in making collections of rare objects from the mineral and vegetable kingdoms. Perhaps a few are collectors of old china, and naturally want a cabinet in which they can show the fruit of their labours to the best advantage; and at the same time stow them away safe from the ravages of the domestic servant, who, under the pretence of "dusting," would gladly smash everything destructible in a house: the most valuable articles being, of course, the first to be destroyed. The article shown in the accompanying design may at first sight appear too complicated for the amateur carpenter to make, but on a close study of the drawings and reading the following directions these difficulties will vanish. The design is of a cabinet that I have just completed myself, and I think that any other amateur can "go and do likewise" if he has a well-stored chest of good tools. In execution it looks very well, although the small moulds around the panels are all stock patterns. This cabinet can be made into an excellent bookcase, being much preferable to a few open shelves, the glazed front effectually keeping out the dust; and the cupboard beneath would then be a good place to keep unbound magazines and journals.

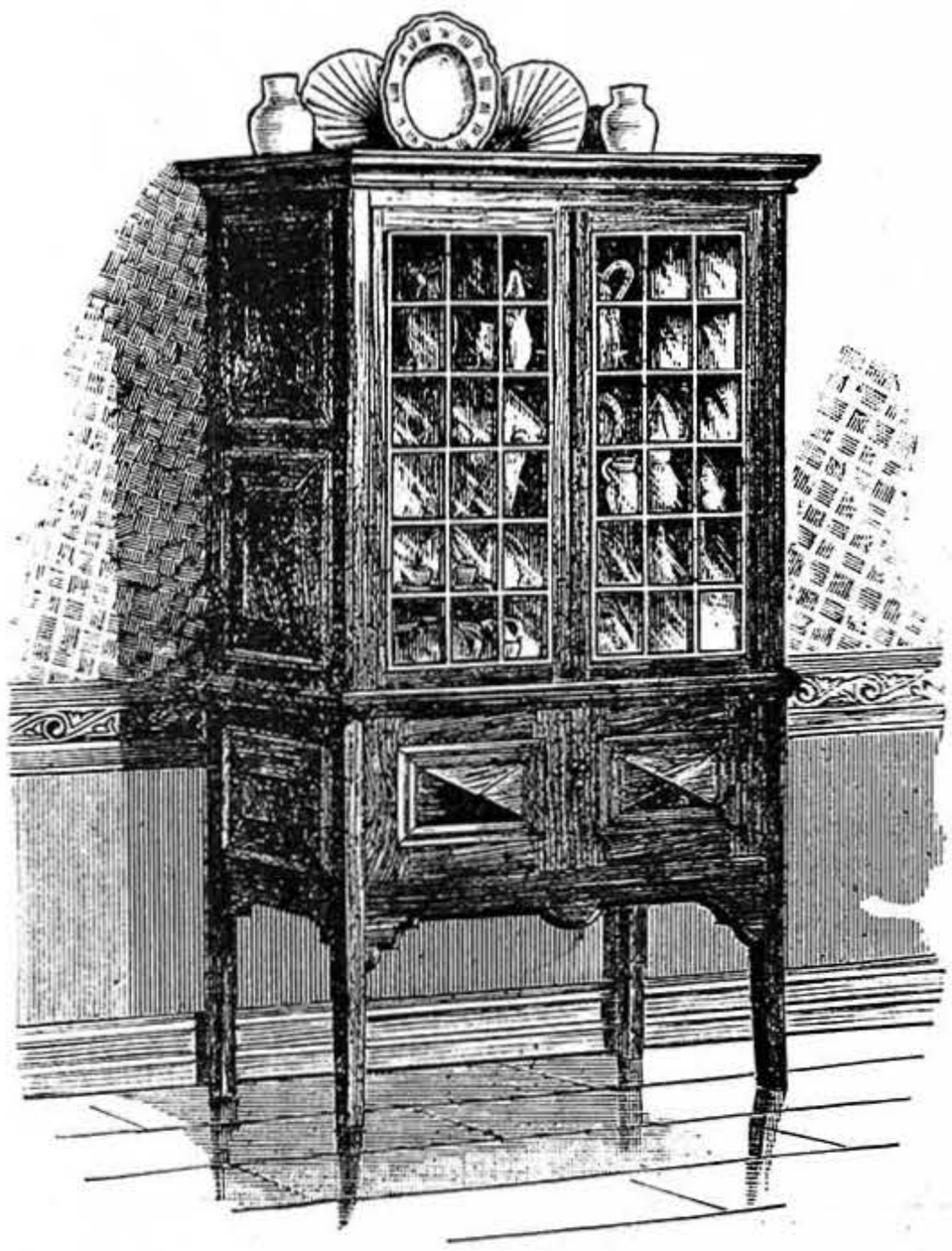

Fig. 1.—Perspective View of Cabinet for Old China.

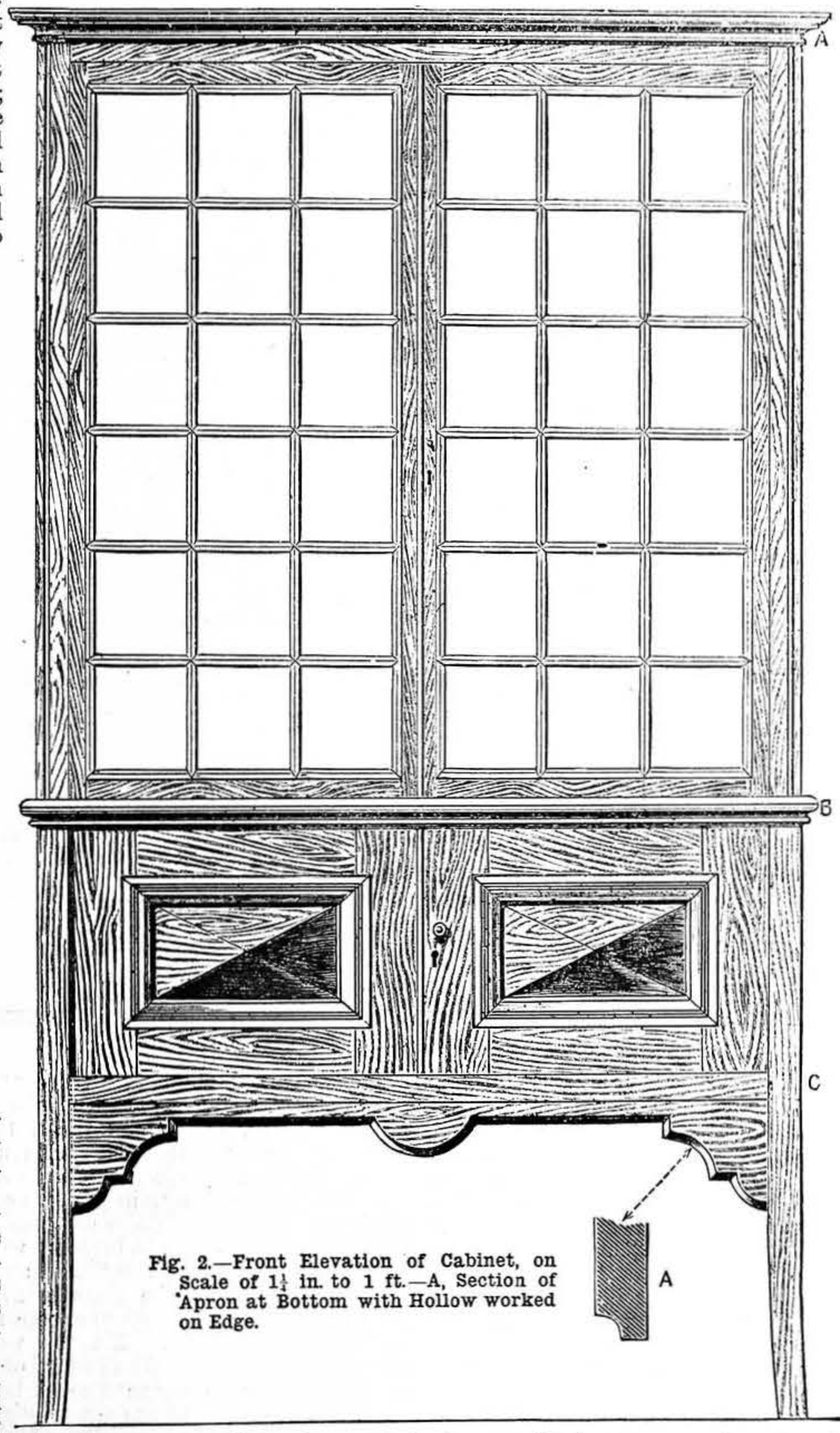

Fig. 2.—Front Elevation of Cabinet, on Scale of 1¼ in. to 1 ft.—A, Section of Apron at Bottom with Hollow worked on Edge.

The following are the measurements and lengths of wood required:—

1¾ in. square in four corner posts, 22 ft. run; 1¾ in. square stuff elsewhere, 22½ ft. run; ½ in. back, 11 ft. 8 in. super.; 1½ in. top, A, 4 ft. 3 in. super.; 1¼ in. shelf, B, 4 ft. 3 in. super.; 1¼ in. shelf at C, 3 ft. 6 in. super.; ¾ in. four shelves in cabinet, 13 ft. 4 in. super.; 1 in. mould round sides, 15 ft. 8 in. run; 2 in. bolection mould in front panels, 8 ft. 4 in. run. The glazed frames in front are formed of 1 in. by ⅞ in. stuff, with ½ in. bars. The

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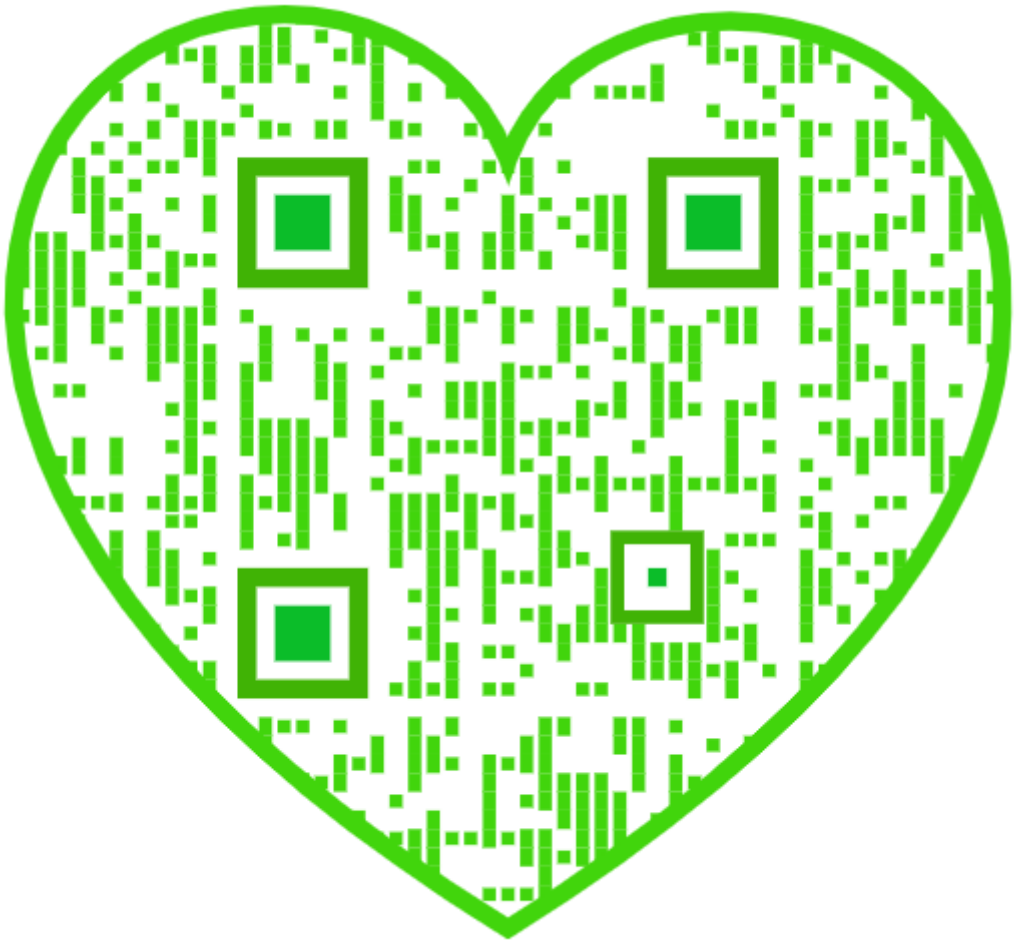


frames to lower doors are 3 in. by ⅞ in., with ⅝ in. bevelled panels. The panels at the side are of 1 in. stuff, also bevelled. The size of the cabinet when finished is 5 ft. 6 in. high, 3 ft. broad, and 1 ft. 3 in. deep, outside measurements.

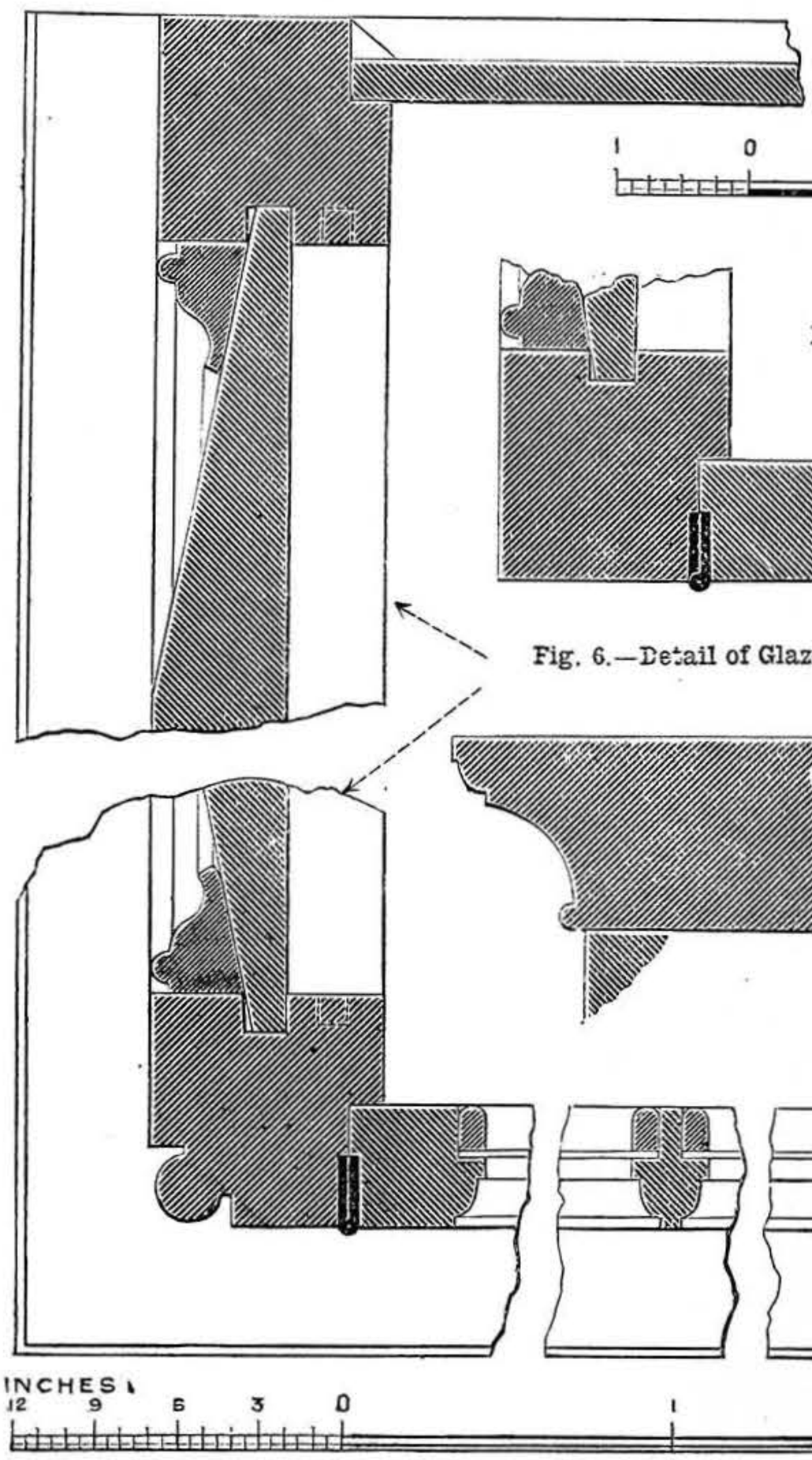
If an inexpensive cabinet is desired, the wood used may be red or yellow deal.

The angle uprights should be first cut out, the two in front to diminish at the bottom. Between A and B (Fig. 2) a bead is worked on the angles, and a groove is made for the side panels. The front uprights must be rebated ¼ in. for the glazed doors, and the two back uprights rebated ½ in., as shown. The horizontal pieces grooved similarly for the panels must now be tenoned into these uprights, the panels being got ready and fitted into the grooves at the same time, similar to the manner in which a panel door is made. The moulds are then mitred properly and bradded on. The ornamental apron at the bottom is cut out of 11 in. by ½ in. stuff, and tongued into the uprights, etc. A hollow is worked on the edge, as shown at A (Fig. 2). On each of the sides of the cabinet four strips of 2 in. by ¾ in. stuff are tenoned into the uprights to take the shelves. The shelf, B, is 1¼ in. thick, with 1 in. projection; a mould is worked on the outer edge, and the square holes for the front uprights are chiselled out carefully, and holes are cut also for the back ones. This method of keeping the shelf in one piece necessitates more care and time than if the mould is merely planted on; but, on the other hand, it adds to its good appearance, and makes a better job. This shelf and the top, A, are firmly secured to the horizontal pieces. The shelf, C, is 1¼ in. thick, rebated and screwed to the horizontal pieces all round, and cut out where the angle studs occur. The four intermediate shelves, three in the glazed front and one in the cupboard underneath, of ¾ in. stuff, are now screwed to the pieces mentioned above for the purpose. As an appearance of lightness and elegance is required in a cabinet of this description, the moulding at A is purposely made of very little height. It is worked on the top piece 1½ in. thick, thus dispensing with the heavy cornice which is usually fixed on sideboards, wardrobes, etc. The back can now be placed in the rebates, care being taken to fix the pieces firmly together, with triangular strips nailed round to keep them in close.

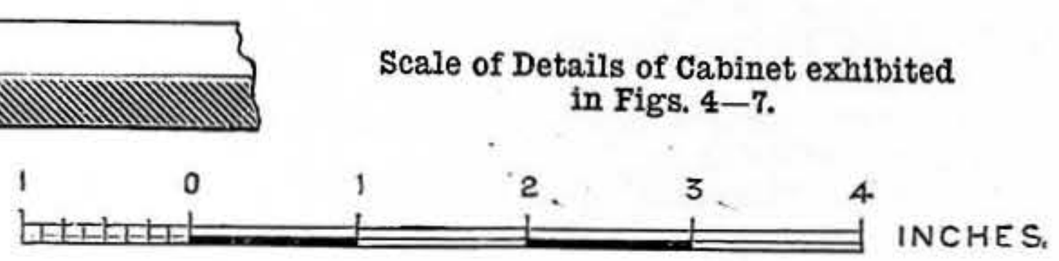
Everything is now in position except the doors. The glazed doors are each 2 ft. 10 in. high and 1 ft. 4½ in. in breadth, with frames and bars as before mentioned and rebated meeting styles. The glass is 21 oz. best sheet, care being taken to choose it without flaws and bubbles. Fit the panes with beads inside, bradded on instead of puttying. The doors are hung with small brass butts. A couple of small bolts are required in one leaf, and a small china handle and lock and key on the other. The frames of the two lower doors to cupboard are tenoned together, and a 2 in. mould run round panel. The hinges and fastenings are similar to those in the glazed front.

An excellent method of treating the cabinet is to paint it three coats, leaving the panels a sage green, the frames a blue green (called, I believe, "French" green), and the mouldings picked out in dark green and black, and afterwards varnishing the whole.

The sketch in Fig. 1 gives an idea of how the work will look when completed, and I think the above description will make everything clear. If there is anything that any reader may not understand, I shall be pleased to correspond with him through the columns of "Shop." I do not, however, think that any woodworker of average capacity and skill will find much that is difficult in the construction of the cabinet. The parts that will prove most troublesome are the glazed doors, but it is recommended that the style shown in Figs. 1 and 2 should be adhered to, as it is thoroughly in harmony with the other parts.



Scale of Figs. 2 and 3, 1¼ in. to 1 ft.



Scale of Details of Cabinet exhibited in Figs. 4—7.

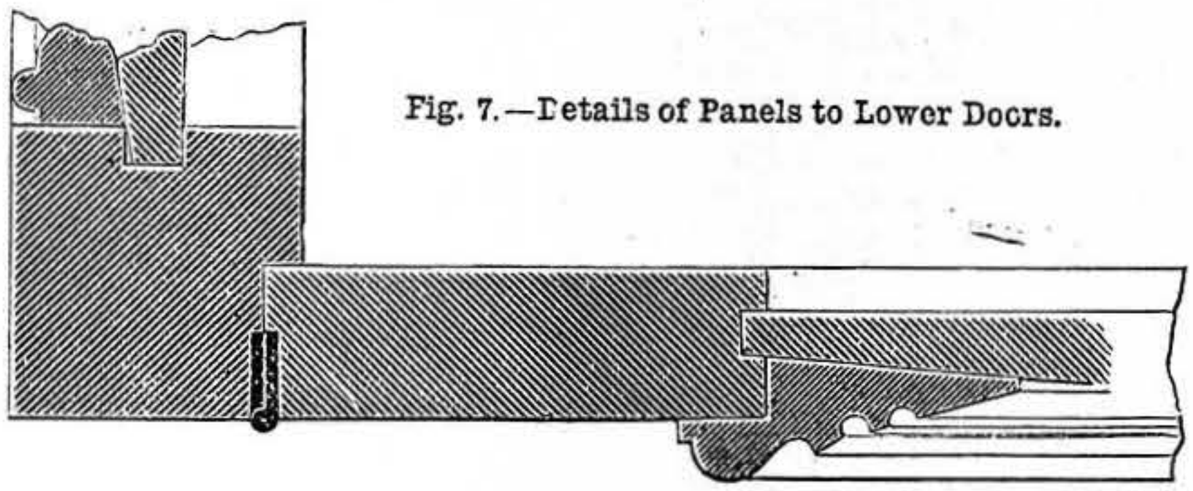


Fig. 7.—Details of Panels to Lower Doors.

Fig. 6.—Detail of Glazed Door.

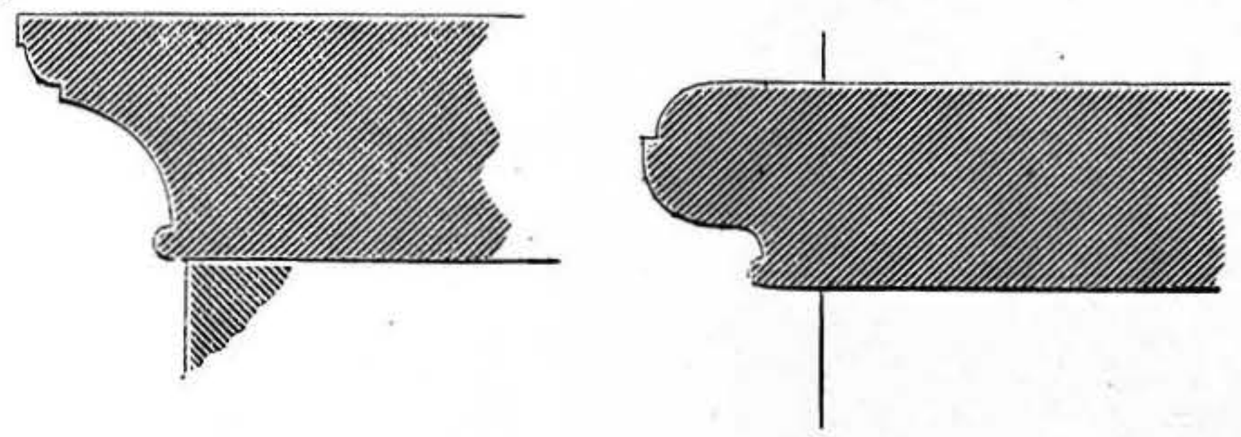


Fig. 4.—Moulding of Edge of Shelf at A, Fig. 2.
Fig. 5.—Moulding of Edge of Shelf at B, Fig. 2. (Scale, half full size.)

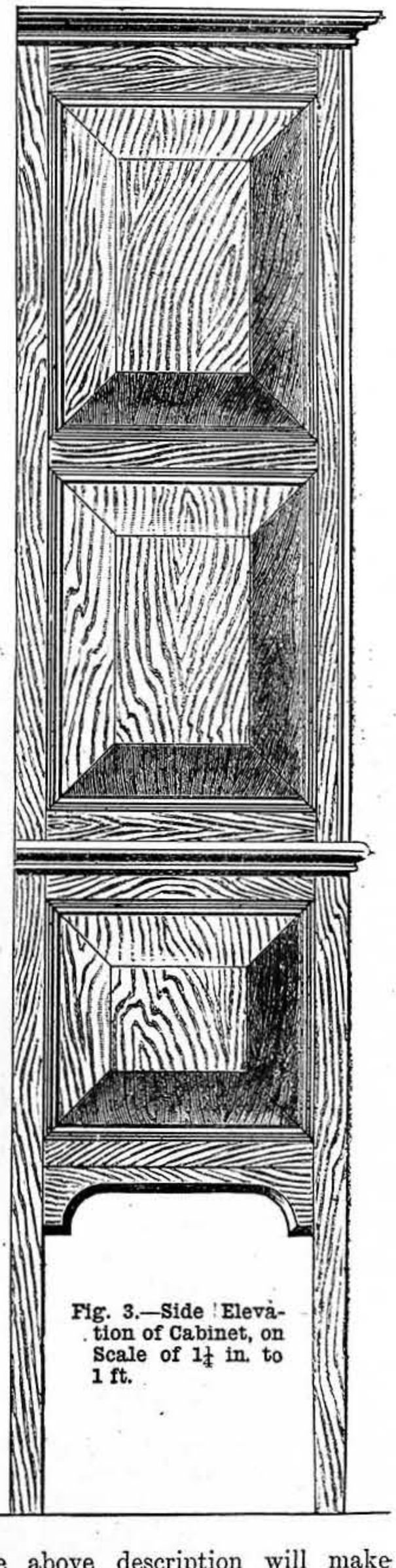


Fig. 3.—Side Elevation of Cabinet, on Scale of 1¼ in. to 1 ft.

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THE SAFETY BICYCLE: ITS PRACTICAL CONSTRUCTION, ETC.

BY A. S. P.

FRAME READY FOR THE FITTINGS—MAKING AND BENDING L-PIN—BRAKE-WORK—BRAKE LEVER—LAMP BRACKET—MUD-GUARDS—ADJUSTING PINS—DRIVING AXLE AND CHAIN WHEEL—CRANKS AND PEDALS—FOOT-RESTS AND STEP—SADDLE AND SPRING.

WE left our frame brazed up and finished ready for the various fittings, such as brake-work, mud-guard, L-pin, etc., and we have the frame with these parts in place in the annexed illustration (Fig. 29). The other figures accompanying this chapter are Fig. 30, L-pin; Fig. 31, A, B, brake lever; Fig. 32, A, B, brake spoon; Fig. 33, A, B, adjusting ring with lamp bracket; Fig. 34, brake-spoon hingeing-pin (full size); Fig. 35, adjustable brake-rod complete: A, the $\frac{3}{8}$ in. tube; B, the rod; C, the lower fork for attaching to spoon back; D, the upper fork for attaching to brake lever (Fig. 31); E, adjusting piece with set-screw (Fig. 38) fixed on upper end of tube, A; Fig. 36, ends of mud-guard stay-rods that fit on to axles (full size); Fig. 37, A, B, spring bracket for L-pin.

We will now proceed to the making and fitting of these parts, and first of all the L-pin (Fig. 30). It is made from a bit of round steel bar turned to $\frac{5}{8}$ in. exactly; it takes 13 in. of stuff to make. After being turned and smoothed ready for the final polishing, it is bent to a right angle, the two arms being equal lengths. The bending may be easily done as follows: heat up to a bright red in the centre; cool both ends in water, leaving $1\frac{1}{2}$ in. in the centre red; then grip in a vice and slip a piece of tube on the other end to act as a lever, and the bar will be easily bent to the required angle. Of course, the whole thing has to be done pretty smartly in order not to lose the heat. After bending, the L-pin has to be finished for nickel-plating by polishing on the emery-wheels, or, in the absence of wheels, with fine files, emery-cloth, and oil. In draw-filing with fine files it is an improvement to chalk the file. All cross file marks must be removed by draw-filing before the work is ready for emery-cloth.

Before finishing L-pin see that it moves freely in the vertical socket in the frame, and that the spring bracket (Fig. 37) also moves freely on it. The ends of the L-pin should be nicely rounded, and after the whole is polished with the finest emery-cloth it is ready for the plater.

We next take in hand the brake-work. The spoon (Fig. 32) is a stamping or casting; A is the upper side, B the side view. The end C is that which receives the hingeing-pin (Fig. 34). This part of the spoon is as long as fits in between the fork sides; it is bored right through for the pin $\frac{5}{16}$ in.; its place within the fork sides is $\frac{1}{2}$ in. clear of the wheel rubber. A hole is bored through each of the fork sides to receive the pin, that on the one side being the full size of the pin, that on the other somewhat less, and tapped for the screwed end of the pin. When the pin is in place the ends should be flush with the outer surface of the fork; the head end of the pin has a slot for turning with screwdriver, as shown in the figure. The spoon should move freely on the pin and have no side movement, else it will have a disagreeable rattle on the road. The spoon, after being fitted on its pin, is taken out and finished up, not for plating but for enamelling. On the back of the spoon (Fig. 32) will be seen a pin to attach the lower fork end of brake-rod. The fork end, C, is neatly fitted to this pin, and a $\frac{1}{4}$ in. hole bored for a small bolt. The tubular portion of the brake-rod has already been noticed in the brazing process. It has only to be finished up for enamelling like the spoon. The solid rod, B (Fig. 35), is finished $\frac{1}{4}$ in. thick, and should fit neatly and slide freely in the tube, A. It is 9 in. long, including the forked head. This part is bought as a rough stamping, and has got to be finished for nickel-plating. The forked end has got to be fitted to the end of brake lever (A, B, Fig. 31). The fork is first filed with a flat file to receive the lever; the lever is then filed down to fit in tightly meantime. When fitted in, a $\frac{1}{4}$ in. hole is bored through both fork sides and lever to receive a bolt and nut, same as at spoon back. These bolts are bought for the purpose with neat hexagon heads and nuts. When the hole is bored as above, a piece of wire is driven into it and the fork part and lever filed up and finished together, which makes a neat tradesmanlike job. The set screw at E fixes the rod, B, at any desired height within the tube when adjusting the handle-bar.

We now tackle the brake lever (Fig. 31). This is 15 in. long and $\frac{7}{8}$ in. broad at the broadest part—namely, where it hinges to the lever lug (Fig. 26, page 356). It is about $\frac{1}{4}$ in. thick throughout its length, but at the right-hand end in the figure it is flattened out in the edge direction into a shallow spoon form, as a grip for the hand. When bought, the lever is a straight bar, and has got to be set. The end, A, B, has a double bend. This is necessary to bring it out in front of the steering-post, the lever being hinged directly under the handle-bar. At C the lever has to be bent to the same set as the handle-bar, so that the spoon part will be immediately under the handle, in the best position for gripping. This lever being fitted into the lug, D (shown full size, Fig. 26), has to be bored for $\frac{1}{4}$ in. bolt, as before described.

The spoon end of the lever is set downwards, as shown in A (Fig. 31), and this being done, this part—namely, the brake lever—is finished by grinding and polishing, or by filing, to be nickel-plated.

Fig. 33, A, B, is the lamp bracket and set-screw collar combined. This part may be neatly fitted to the top of the steering-tube. It is a steel stamping, and has to be finished up for plating, so it is not brazed, but fixed to the tube with two small flush screws. As will be seen from B, Fig. 33, a hole is bored through the bracket through which the brake-rod passes. The back part of this bracket is bored $\frac{5}{16}$ in. and tapped $\frac{3}{8}$ in. for the set-screw.

The adjusting cone ring, C (Fig. 8, page 168), here shown full size (Fig. 38, in section), is fitted on to the steering-tube before the lamp bracket at top; it also has a set-screw flush with a slit for a screwdriver. This part is turned and finished in the lathe, and is plated.

Now, having completed that part of our work, we will attend to the mud-guards.

The mud-guards are made of very thin steel, and are rolled to fit any size of wheel required, and in section like Fig. 39. The rear mud-guard is about a half circle, that for the front wheel being somewhat less than one-fourth of a circle. The front guard is fixed by a screw at its upper end hard under the fork crown, where a hole has been previously tapped and the screw fitted; it should at this part be an inch clear of the tire. The lower end is supported by stays (see Fig. 36). These stays may be round, flat, or half-round iron. I have shown them of half-round iron, as in section A. The ends have to be doubled in forging to get stuff enough to form an eye with a $\frac{7}{16}$ in. or $\frac{1}{2}$ in. hold, as the hub axle may require. The manner of forging these is clearly shown in the figure. This stay is made long enough to form the pair; it is simply bent in the middle to go round the *outside* of the mud-guard, and should be made of a length to stay the guard one inch from the tire, as at the upper end, as the neatness of a machine depends very much upon having the mud-guards concentric with the wheel tires.

The rear mud-guard is fastened to the frame at two points: first at the bottom bracket by a small screw to the tube; second, to the rear of the socket at upper end of the bent tube, D (Fig. 1, page 33). It is also stayed at two points by stays made exactly as the front guard stays. The inner ends of the stays are slipped on to the ends of the axles, and the whole tightened up with the outside nuts. This mud-guard should also be an inch clear of the tire throughout its whole length. The fact of the rear axle being adjustable by sliding in the slots does not affect the position of the mud-guard seriously, as the wheel being moved backwards or forwards in the slots carries the mud-guard with it, the stays being on the axle ends. The stays, where they pass round the mud-guards, are riveted by at least two small $\frac{1}{8}$ in. rivets, and filed off flush on the outside. The rivet holes should therefore be countersunk before riveting.

Fig. 40 is one of the adjusting pins of the rear wheel, full size (see Fig. 6, page 168, where it is seen in place half size). It is 2 in. long and $\frac{5}{16}$ in. thick. Its outer end presses against the axle ends where they are supported in the slots. When the pins are screwed to push the axle outwards, the slack of the chain is taken up, so as the chain wears and requires taking up these screws are brought into requisition. When, however, the axle has travelled out to near the end of the slots, a link must be taken out of the chain and the two screws wound back for readjustment.

I previously described the fitting of the bottom bracket bearings by bolting through the knuckle joints. They should now be fitted in together with the axle and its chain wheel: without the key, however, as yet. Now the rear driving-wheel is put in its place and adjusted to run in the centre of the fork tubes, otherwise to run in line with the bent tube in front of it. This being done, the chain wheel has got to be set exactly in line with the hub cog-wheel. This may be done by using a straight-edge or a taut string, or even a good eye. When the two wheels are got into line, the chain wheel is marked in its place on the axle, and the latter being removed from the bearings, the wheel is firmly keyed on.

It takes about 4 ft. of chain for one machine. This chain is provided with a small bolt and nut. This bolt fits the holes in every link, so that wherever the chain may be cut the bolt fits for joining. To fit a chain on a new machine, the rear wheel axle should be pulled in to the inner ends of the fork slots; when the chain is placed over the wheels and the ends placed alongside each other, it will be seen at once which link to remove. To cut the chain, both the rivet ends of the same link are filed down level, then punched out, and the bolt will fit the rivet-holes. The chain will hang loose, and has got to be pulled up by the

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adjustment screws above referred to. It must be observed that for use the chain should not be pulled tight; the bottom half of the chain should hang a little curved when the upper side is taut, as when driving the machine.

If the cranks are bought in the rough, they are first bored to fit the axle ends, which should come through flush, and no more. I have shown in detail the two prevailing forms of cranks (Figs. 17 and 18, page 308). The cheaper crank is Fig. 17, keyed on; so it will remain a matter of choice which of the two sorts is adopted. The most approved length of cranks is from 6½ to 7 in. The outer ends of the cranks have a slot some 1½ in. long, to allow of varying the stroke of the pedals. The inner ends of the pedal pins slide in the slots, and are fixed at any desired place by a ½ in. nut with a washer behind it.

The pedals are generally bought ready-made and plated, and they may be plain or ball, according to the depth of the pocket of the buyer.

Pedals may be made up from the parts, however, as all the parts are sold by the dealers. In preparing the cranks for the pedals the slots must be filed out till the flattened end of the pedal pin enters, when it should move freely along the slot without shake. Then the cranks are finished up for plating or for enamelling, according to choice, although they are, as a rule, plated.

The foot-rests on the front fork may be plain pins fixed into the fork sides, and clothed with rubber, the pin having a small nut on the outer end to prevent rubber from coming off; or if the rubbers have close ends, they are cemented on to the pins with tire cement. The adjustable foot-rest is much preferred by many, as it may be placed on the fork side at any desired height. It is made of a steel strip about ½ in. broad, bent double and widened to clutch the fork side, where it is fixed at the back by a small bolt passing through both ends. The upper edges are serrated to prevent the foot slipping. They are nickel-plated, and sold in pairs at about 1s. 6d.

The step (Fig. 7, page 168) is fitted by screwing the tenon ⅜ in. and tapping the extension on the left rear fork; it should be screwed in tightly and filed off flush on the inside, as a nut might interfere with the hub.

If a rubber step is preferred, a plain ⅜ in. pin some 2½ in. long, with the outer end reduced and screwed for a ¼ in. nut, a piece of pedal rubber, or a foot-rest rubber, is placed on the pin, and a small washer and nut keep it secure.

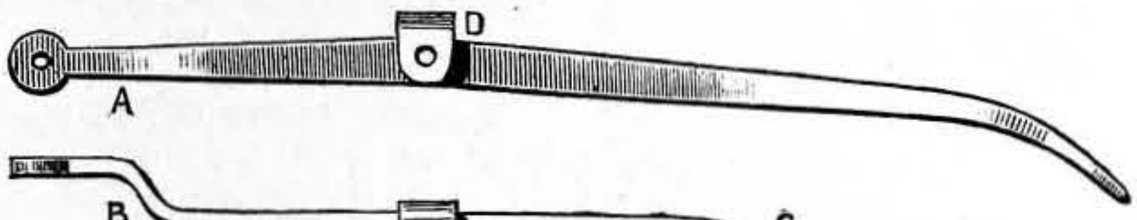
Another kind of step is the loop, which is hung on to the end of the axle, hangs down about 2 in., then turns upwards, and has a round flat button for the foot to mount by.

We have now gone over nearly every part of our machine, with the exception of the saddle and spring. We have in the market the saddle and spring separately and the saddle and spring in combination.

When the saddle and spring are separate I use what is called a three-coil spring; the saddle is mounted on top of this, and it is in conjunction with this spring that the bracket (Fig. 37) is used. In the combination the saddle is stretched on a spring frame, having the bracket for the L-pin as part of the under side of the frame, as in Fig. 1 (page 33). This combination is considerably dearer than the other, the cheapest being about 7s. 6d.

Having completed all the fitting, our next work will be the choosing and fitting the rubber tires, which I will leave over for the next article, which will be devoted to the consideration of the enamelling and the plating of the bright parts of the machine, as well as that portion of our subject already mentioned. Nothing will then remain to demand our attention except the final fitting up of the entire machine and the last touches necessary for its final preparation to take the road as a machine completed and ready for daily use.

Fig. 40.



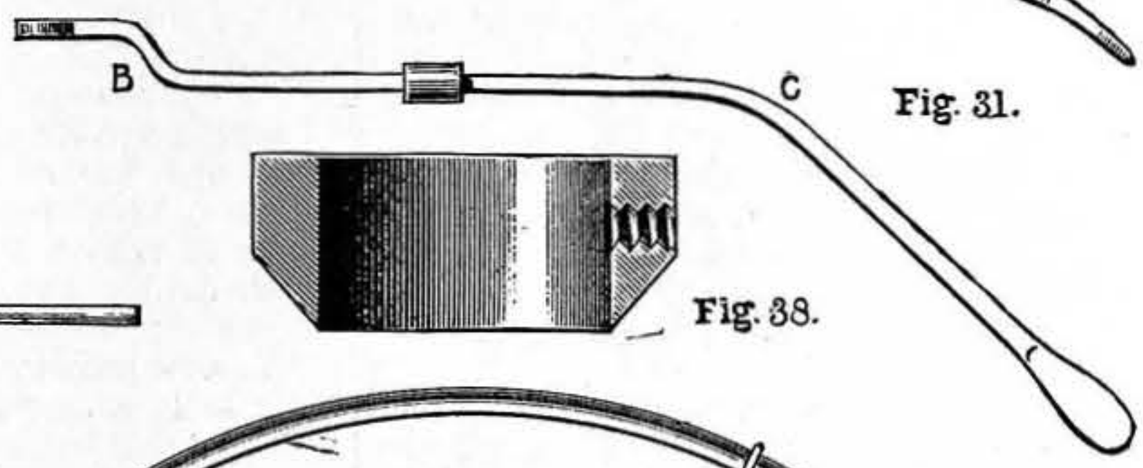


Fig. 31.

Fig. 38.

Fig. 37.

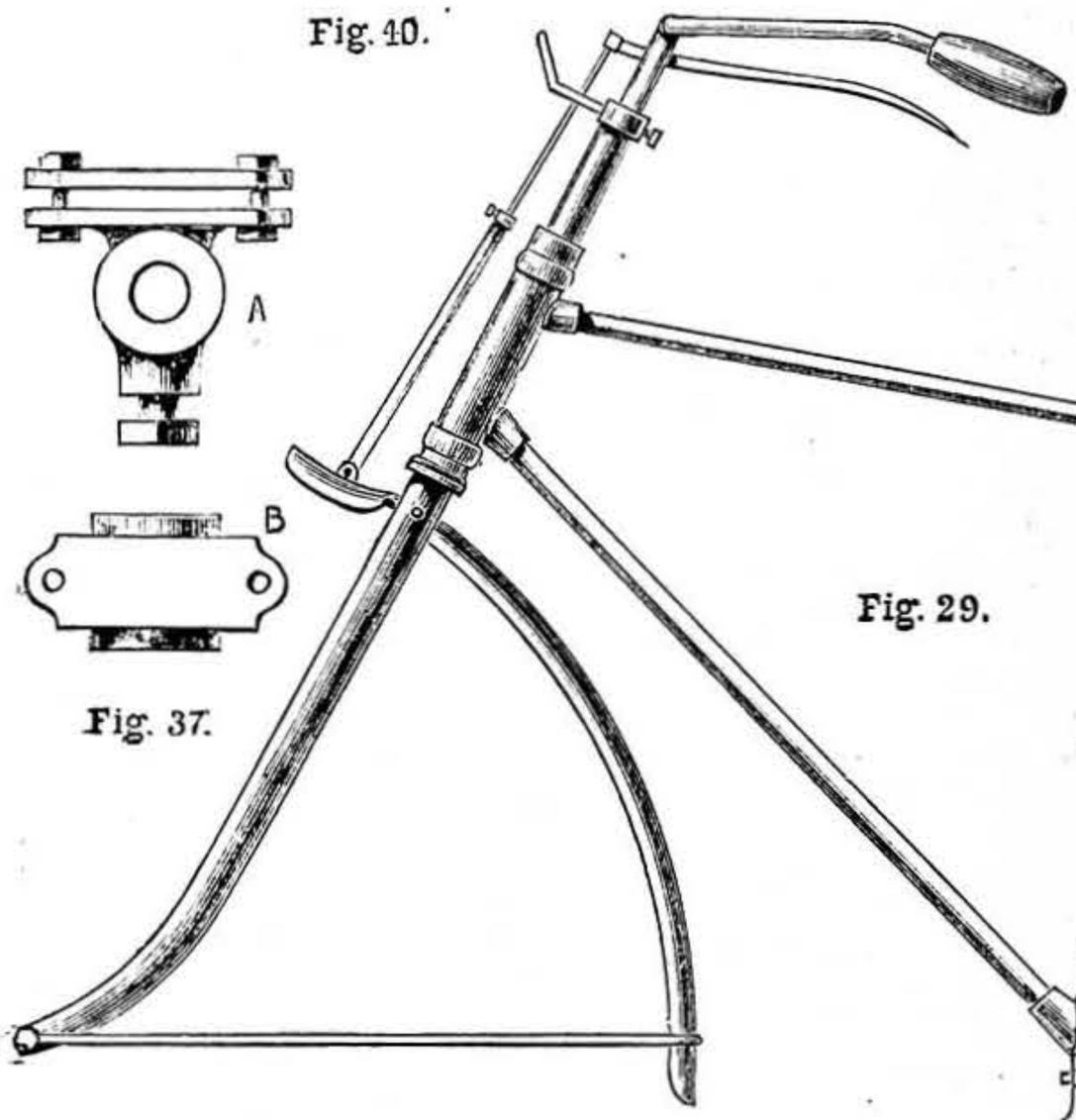


Fig. 29.

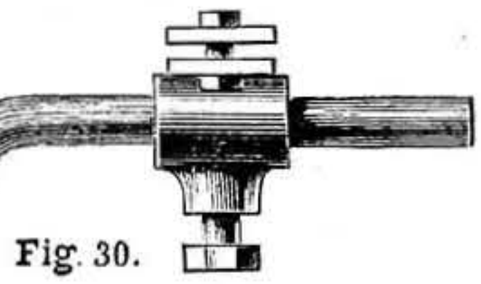


Fig. 30.

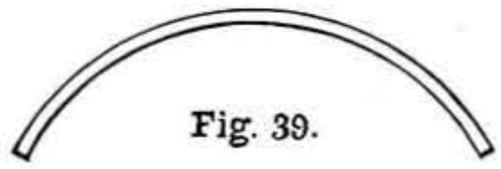


Fig. 39.

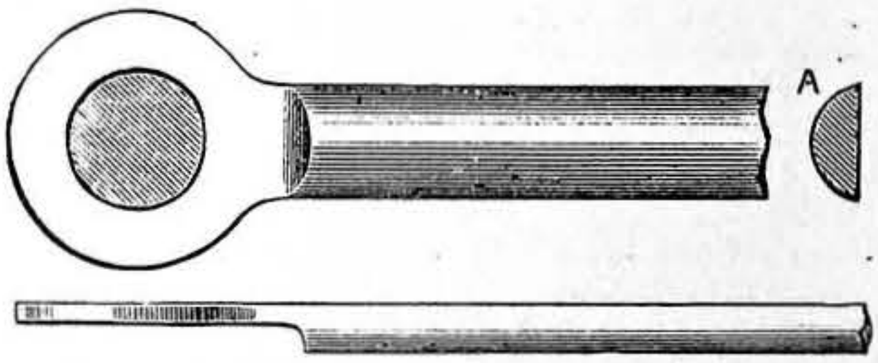


Fig. 36.

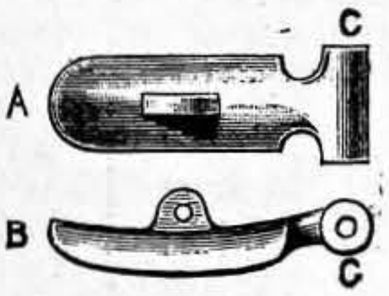


Fig. 32.

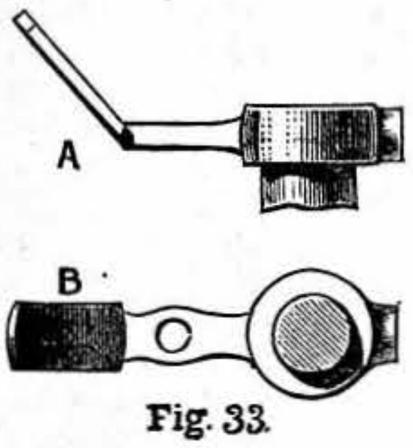


Fig. 33.

Fig. 35.

Fig. 34.

Fig. 29.—The Frame minus the Wheels (⅛ full size). Fig. 30.—L-Pin and Bracket. Fig. 31.—Brake Lever. Fig. 32.—Spoon. Fig. 33.—Lamp Bracket. Fig. 34.—Spoon Hinging-pin. Fig. 35.—Brake-rod. Fig. 36.—Mud-guard Stay Ends. Fig. 37.—Spring Bracket. Fig. 38.—Adjusting Collar. Fig. 39.—Section of Mud-guard. Fig. 40.—Screw for adjusting Chain. Figs. 30, 31, 32, 33, 35, 37 are ¼ full size. Figs. 34, 36, 38, 39, 40 are full size.

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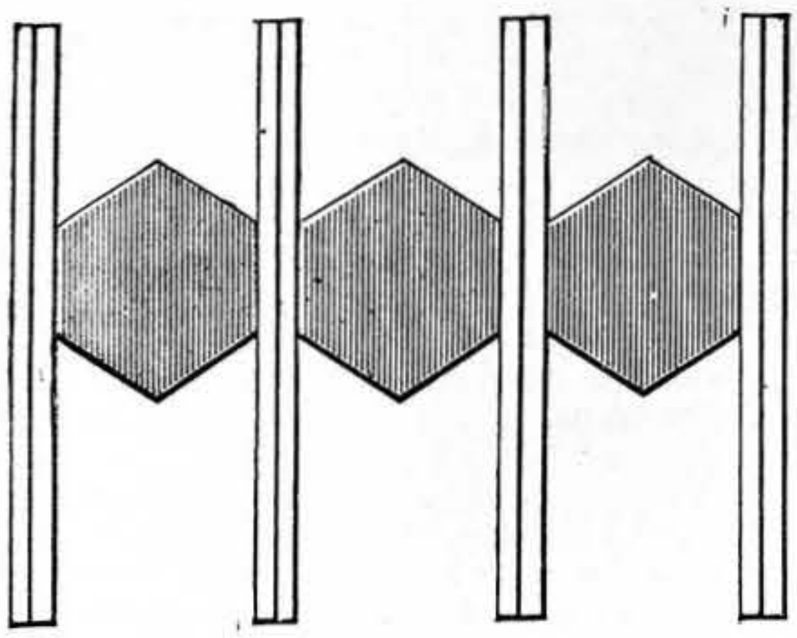

Fig. 84.—Laying out of Wires to be turned as in Fig. 83.

WIRE-WORK IN ALL ITS BRANCHES.

BY JAMES SCOTT.

Peg Latticing—Hexagonal Mesh.

Every day one meets with fencing along palisades, in front of poultry pens, along garden walks, etc., of the description represented in Fig. 83. This pattern is one of the commonest made use of, but it is being greatly superseded by the diamond crimped mesh. However, the hexagonal mesh is a very useful and strong description of work, and deserves the patronage it has received.

The hand method of working it is comparatively simple. The process is delineated

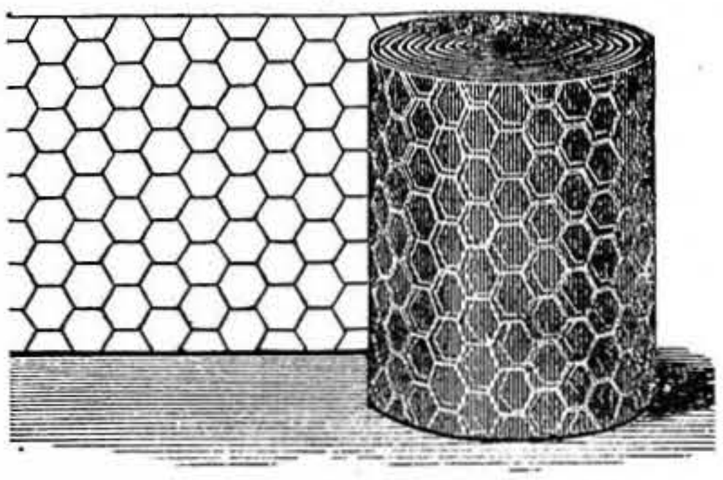

Fig. 83.—Roll of Peg Latticing or Hexagonal Mesh.

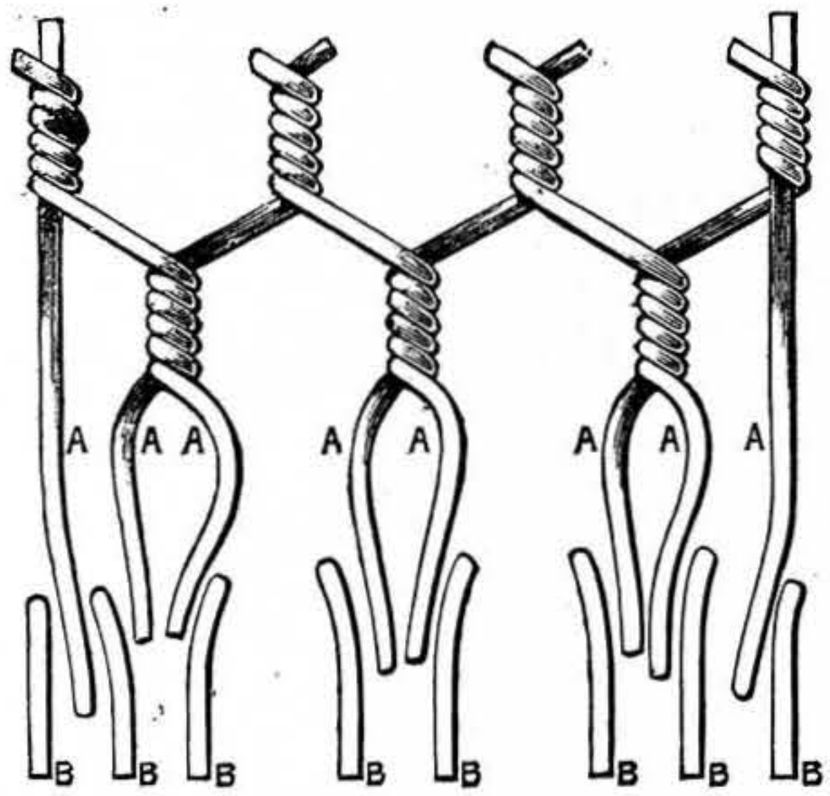

Fig. 86.—Progressive Continuation of Twisting: Second Stage.

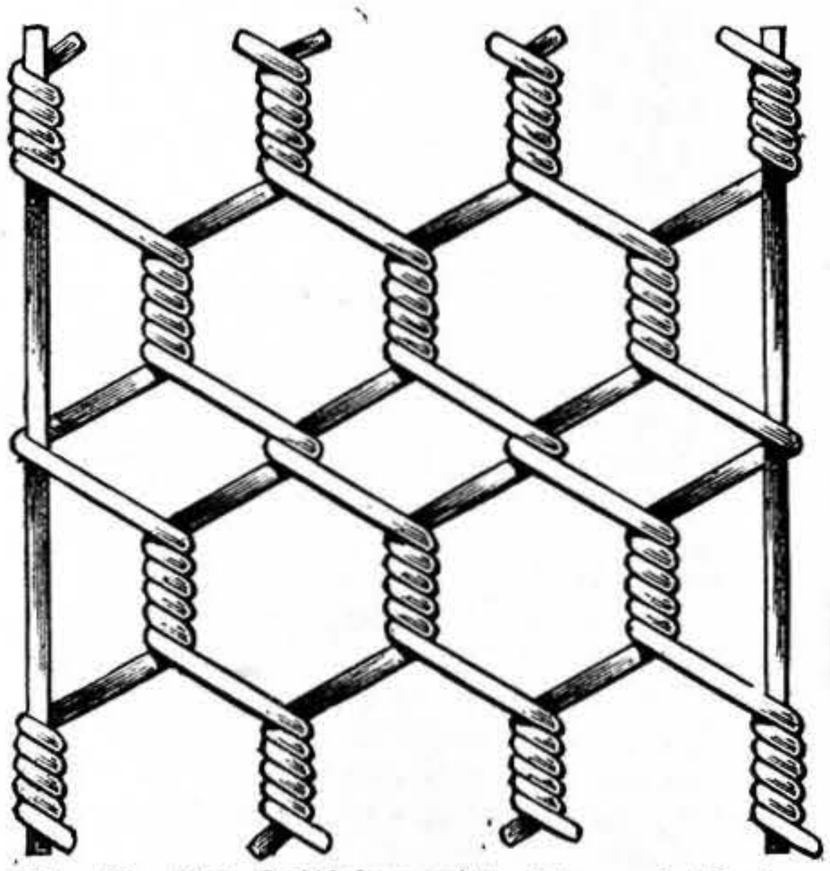

Fig. 90.—Peg Latticing with Diamond Meshes intervening.

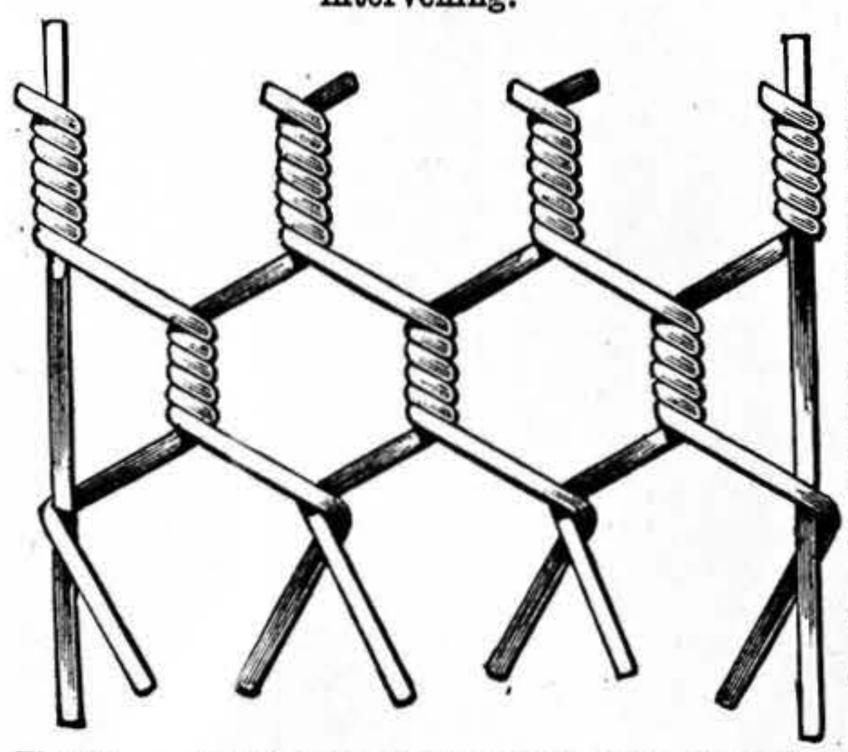

Fig. 92.—Diagram showing how Wires are crossed to obtain Diamond Meshes.

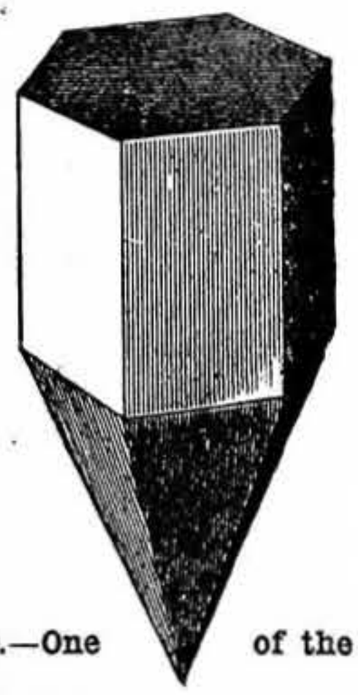

Fig. 89.—One of the Pegs.

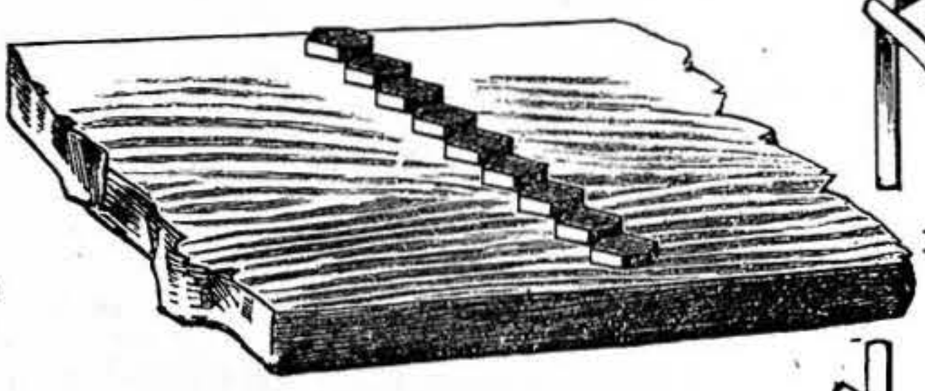

Fig. 88.—Perspective View of Pegs round which Wires are twisted.

in the progressive diagrams (Figs. 84, 85, 86, and 87). A number of hard wood or iron pegs, corresponding in number to the number of clear holes required in the work, are inserted across the bench, as shown in Fig. 88, in a straight line with one another, each peg being separated from the other each side by about the space two or three thicknesses of the wire would occupy, and each being hexagonal in shape, as represented in Fig. 89. The pegs must be the same size as the mesh required to be made.

An even number of wires of the proper gauge are laid, as in Fig. 84, on the bench. One pair will be on the outside of the end peg at one side of the bench, and another pair on the outside of the peg at the opposite extreme; while the remainder will be disposed of in pairs between the rest of the

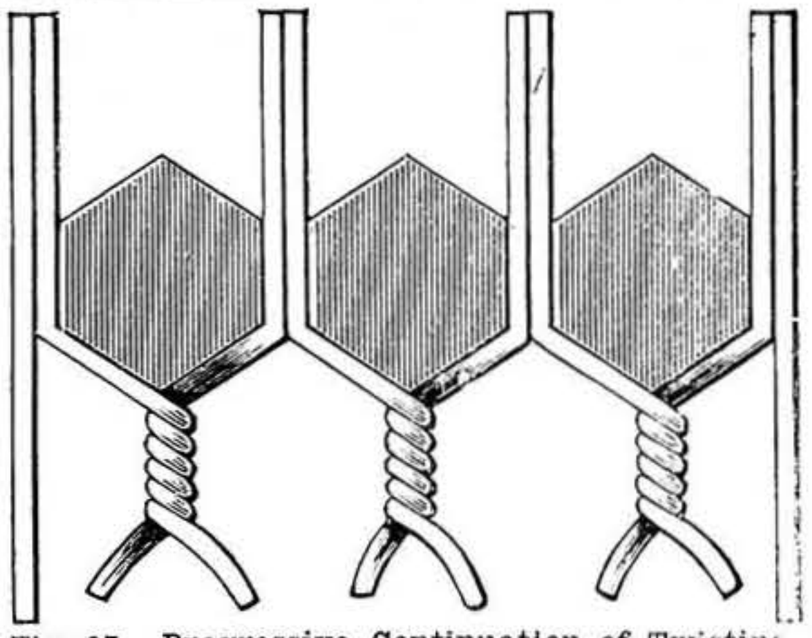

Fig. 85.—Progressive Continuation of Twisting: First Stage.

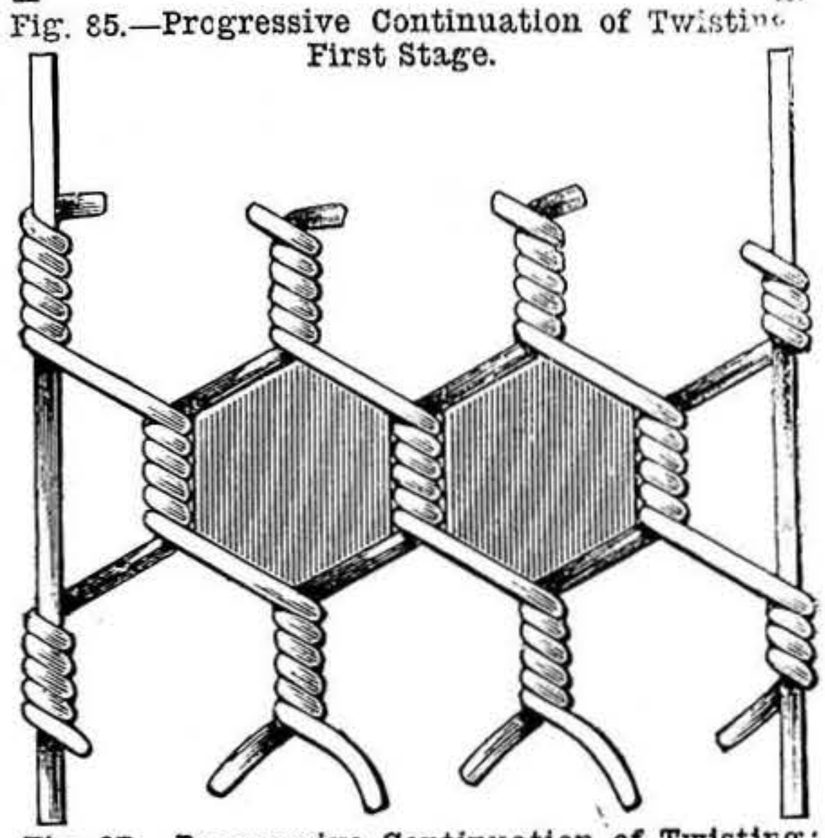

Fig. 87.—Progressive Continuation of Twisting; Third Stage.

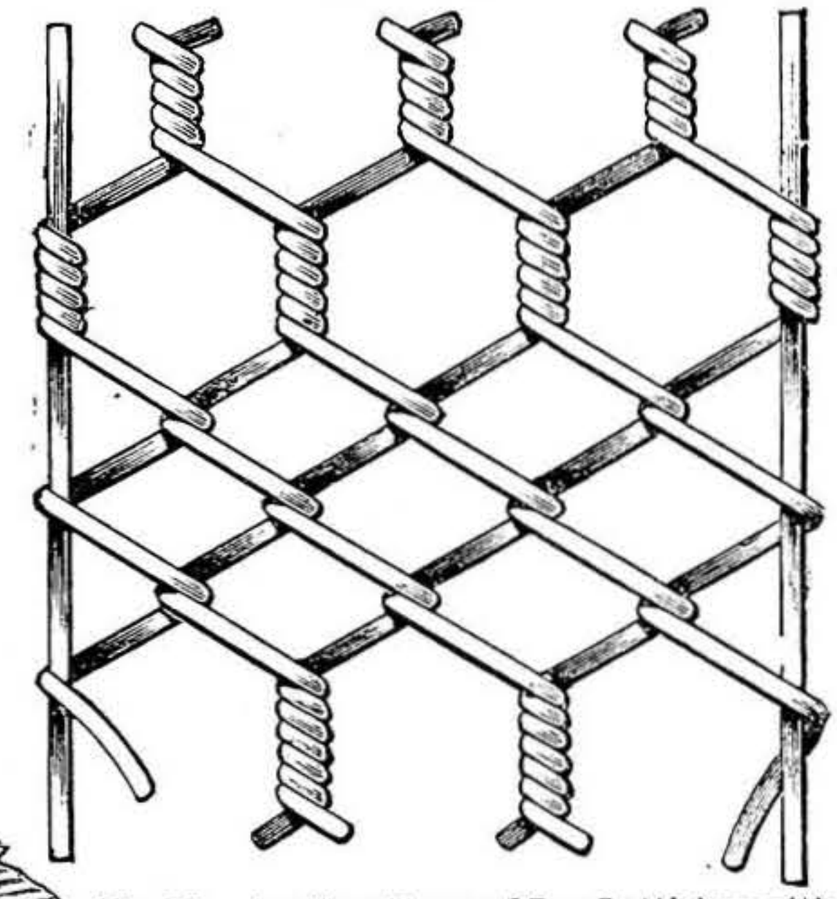

Fig. 91.—Another Form of Peg Latticing with Diamond Meshes intervening.

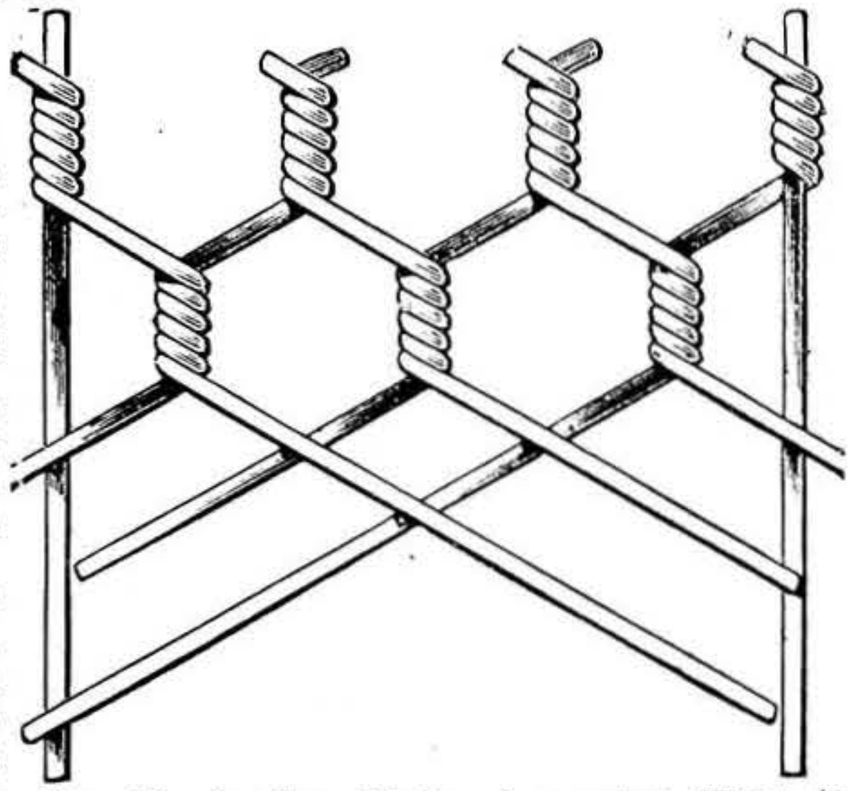

Fig. 93.—Another Mode of crossing Wires to obtain Diamond Meshes.

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pegs. I have only used three imaginary pegs in my illustrations, for the purpose of economising the space at my disposal.

A wire bound round the bench can secure the wires temporarily by the latter being hooked on to it; or small staples can be driven into the bench, on to which the wires may be attached; or, in lieu of these means, the ends of them can be turned and driven into the bench. The object for thus temporarily securing them will be understood as I progress with my description.

The inner wire at one side, and the one nearest to it of the adjacent pair, are twisted by the hands or pliers, according to the toughness of the work, until the twisted section is in length equal to one side of the hexagon (Fig. 89); then the remaining single wire of the second pair is twisted in a similar manner in connection with the wire nearest to it of the third pair. So the operation is proceeded with until they assume the appearance shown in Fig. 85. The two outside wires will always remain in a straight line—*i.e.*, they will not follow a hexagonal shape, but merely be twisted round the others where necessary. The ends which have until now been secured to the bench must be twisted, and will appear as in Fig. 86. At this stage the work is placed over the pegs, as in Fig. 87, a half mesh remaining outside the pegs at each end. It will be found necessary to remove one of the pegs occasionally to permit this to be accomplished.

When in the position last mentioned, the same process is followed as described above, a wire in each pair being twisted around the wire nearest to it in the pair close by. Every time they are twisted the same number of turns must be given them to bring all twisted sections to the same length as each other. By following these means, any length of netting or latticing can be made; the finished portion being rolled when it becomes a source of inconvenience. It will be necessary to use a weight to keep the work steady.

When the ends of the wires are reached, they can be joined on to others in order to continue the length. We will suppose that the ends are shown in Fig. 86 (A). The ends of the wires to be continued with these are indicated by B (Fig. 86). Each separate wire of B is twisted around the wire facing it in A for a certain distance, which certain distance must be just so far as will allow the sides of the mesh, when the pegging is continued, to be of clear wire as the remainder is composed of.

There are other variations of the same method, the results of which present a very different aspect—at any rate, in some opinions. I am of this opinion, for I should most decidedly say that the meshes shown in Figs. 90 and 91 are each different in appearance to the other, and both present a different aspect to the one we have just previously given attention to.

We will take Fig. 90 for our present consideration. In this mesh a single row of diamonds is introduced between every two, three, or more rows of hexagonals. The hexagonal pegs will serve for this description of work every bit as well as for that of merely hexagonal ones. To effect the difference, it is only necessary to allow the plain wires to cross one another, as in Fig. 93, when a row of hexagonals is finished, instead of placing them in a continuous straight line as is done in Fig. 85. The wires, where they at first cross one another, are then twisted with two turns, again coming straight, as shown in Fig. 86. Here they are proceeded with in the same manner as at the start of the work; each pair where they cross being twisted, as in Fig. 92.

Dealing with the mesh in which there are two rows of diamonds, it is quite sufficient to say that the method of working will only differ from the others noticed in that the wires are again crossed when one row of diamonds have been completed, and are treated in exactly the same manner by being twisted twice, and then continued in a hexagonal mesh.

There are other varieties of this mesh. Sometimes the twisted sides of the hexagon are lengthened to twice the distance occupied by the plain sides; but those which I have endeavoured to make clear to the reader will convey an idea of their construction.

Very many workmen were in the habit of using but one peg to make this kind of netting. It is true that "experience teaches;" and that is the reason why they could twist the wires to form a hole, take them off the peg, make more holes, and thus finish the work.

I may in a future paper describe the peg latticing machine, but I do not absolutely promise to do so. There is a gentleman in Norwich who, I am given to understand, enjoys what might reasonably be termed a monopoly of the manufacture of peg latticing—at least, he supplies wire-workers all over the kingdom with this description of goods, the majority of warehouses or workshops preferring to purchase it from him to manufacturing it themselves.

PORTABLE BOOKCASES.

BY H. J. L. J. MASSÉ.

ADVANTAGES OF PORTABLE BOOKCASES—OXFORD BOOK-BOX FOR READING MEN—WRITER'S BOX-BOOKCASE—TWO-SHELVED BOOKCASE—ALTERNATIVE METHOD OF CONSTRUCTION—HANGING SHELVES.

THOUGH a portable bookcase is to many persons quite unnecessary (and they may pass over what I have to say on the subject), still, on the other hand, there are many people who, when away from home, cannot, from the nature of their calling, manage to be absolutely without a few books on some special subject or other, or a few books of reference. Many persons are deterred from transporting books with them on their travels because of the damage often done in transit to their mute but trusty friends, and also because of the difficulty of placing them conveniently for use and of securing them from over-inquisitive eyes.

In my own undergraduate days at Oxford a favourite plan for reading men was to have a box with the inside fitted with movable and easily adjustable shelves. This book-box being made of deal as a rule, or pine, fitted with a lid sliding in a groove, could be fastened with a till lock or one or two screws and sent home or to one's destination during vacation, reading parties, or what not, by goods train.

This form of bookcase is, in my opinion, the best for actual travelling, though others may be considered more portable, and can be put together by anyone who is at all clever with his head and fingers at a very small cost. While I am writing I have by me a mahogany box which I use as a book-box. It measures 16 in. by 9¼ in. by 6 in., and will hold about thirteen or fourteen books of average thickness not exceeding the size known as post octavo. It is a cigar box with a sliding lid, and was bought long ago from a tobacconist when I was a boy and delighted in having a box to keep my treasures in. After its partial covering of gaudy paper had been removed by soaking, it was French polished, and finally I fitted it with an American window-sash lock. These locks, by the way, slightly resemble the well-known Yale locks in the shape of their keys and general construction. The box can easily be carried by means of a luggage-strap or brass drawer handle.

This form of box-bookcase can naturally be varied in size to suit the wants of any person who may desire to make or possess one. I have seen them 3 ft. square by 8 or 9 in. in depth, and the quantity of books they held was surprising. Larger sizes than this are made, but they are apt to be rather cumbersome, and require to be structurally heavier.

Another kind can be made by anybody skilled in turnery, or could be made by using up banister rails. The mode of construction is as follows:—After choosing and preparing the pieces of wood for the shelves—the size must be left to the maker of the case—and settling on the distance to be allowed between the shelves, two narrow strips of wood, say 2 in. wide and ½ in. in thickness, are to be screwed on at the back of the shelves: about 6 in. from the ends of the shelves is a good distance to fix them. These two strips or slips will serve to keep the shelves rigidly in position (if the shelves are cut out to receive them so much the better), and being screwed in can be removed in a few moments. For the front of this bookcase small columns can be turned and fitted with the two-ended screws used in fixing the ends to curtain poles. These screws will of course pass through holes in the shelves; at the lower end of the columns they may be screwed into knobs which will serve for front feet if the bookcase be designed for standing on a table; at the top ends the knobs may be made slightly more elaborate.

So far I have described the construction of a two-shelved bookcase—*i.e.*, one which will hold only one row of books—but the principle may be extended, and an upper tier for smaller books added as occasion may require. There is scope, too, for design in the shape of the shelves, which may range from the severely rectangular to the what I may call lodging-house mantelboard pattern.

Yet another way of knocking together a small bookcase would be to make the slips for the back slightly stouter, and hinge the shelves on them in such a way that they shut down closely on to the slips for travelling. The front columns would fit in as described above, and would take up very little space in any box or bag.

There is a way of suspending a shelf or set of shelves from the wall with strings or cords, the shelves being adjusted in their places by means of knots. These shelves are certainly portable, but they are often unsightly and untidy because they hang, as they are made, crooked, it being not the easiest thing in the world for anyone new to the work to make a firm knot at a given point in a string or cord. A good way in making them is to use chain, strong in proportion to the weight to be carried; remembering that a chain is in no part stronger than its weakest link. The distance between the various shelves may be regulated by neat little pins of stout wire passing through the links just under the shelves to be supported by them.

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It is advisable, whether cord or chain be used, to fix a thin strip of wood at right angles to the shelf where the holes for the cord or chain are made.

MEANS, MODES, AND METHODS.

AN EXCELLENT BROWN STAIN.

A BROWN stain, which can be used on all kinds of wood, and made a lighter shade if desired simply by the addition of water, can be made in the following way:—Take vandyke brown ¼ lb., a pennyworth of burnt sienna, and 1 lb. of washing soda. Add two quarts of water, and boil for twenty minutes. This stain only costs sixpence for two quarts, is very strong, and will stain floors light oak, dark oak, and walnut colour; and is, in fact, about the most useful stain we can possibly have. H. H.

SPRINGS FOR GLUING PURPOSES.

Very useful articles can be made from old sofa or chair springs by simply cutting them off in rings, by which means we shall get large and small sizes, suitable for all jobs.

Fig. 1. Fig. 2.

Fig. 1.—Spring. Fig. 2.—Method of using Spring.

The method of using them is exceedingly simple. Take, for example, a thin slip of hard wood is to be glued on to a rail, as in the case of drawer work. After rubbing out the glue, pull on a few springs, taking care not to open them too much (but just letting them spring on, as it were), and it will be found they will hold the joint close while the glue sets. A little thought will discover lots of jobs (where glue is used) that the springs will be of great use for. Fig. 1 shows a spring cut off, and Fig. 2 the method of using the spring. H. H.

HOW TO MAKE AN INEXPENSIVE GLASS DOOR-PLATE.

BY FRED JOINT.

WHILST looking over the pages of WORK, men of limited means have, as a rule, first to consider the cost, or probable cost, of articles in the making. No doubt there are many that have fancy articles in their minds, only waiting for the "necessary" to come to hand to commence operations.

Those who had the good fortune to visit the WORK Exhibition, doubtless, carefully examined the "Waste Product" department. In essays exhibited by me was one on the treatment of broken china ware for window-boxes, plant-holders, etc.; and another, cork dust (the packing from grape barrels), for gardens, ferneries, etc.; and now, to complete effects, I herewith give an artistic glass door name-plate, at a trifling cost to make.

First get a piece of glass cut a little under the size of plate required, and then draw your name (or the name you wish) on a piece of transparent paper. This must be drawn neatly and well to ensure good results, so if, however, you are not skilful in lettering, I advise the study and practise of articles in back numbers of WORK on the subject, otherwise procure a copy of Vere Foster's Printing Book, which is sold by or can be got from any stationer, and gives several forms of lettering. When this is mastered, paste the edges to the glass, taking care to put the paper on the top, name upwards. Also be careful to see that it is placed even and straight with the centre.

With a fine camel-hair brush and some brunswick black, follow out all parts *not to show*. When this is dry, trim off any surplus black with any sharp-pointed instrument, and clean the glass with a fine rag, then with gum or glycerine cover the name part left, and again leave to dry or get "tacky." Now cover over with gold leaf, carefully laying it down even and straight, so that when the paper is removed from the front you find the name appearing boldly in gold with a relief of deep black. Varnish the back to prevent damp getting to the gold, and frame in the usual way, staining the frame to match your door.

A more elaborate method is to shade your printing with white and blue, or white and brown, giving the whole a bordering of about ¼ in. in gold.

Cost of materials, complete, about one shilling.

A COMBINATION COAL-BOX AND MUSIC-STAND.

BY W. NEWTON.

NOVELTY AND UTILITY OF DESIGN—PARTS AND MEASUREMENTS — FIXING SIDES — BOTTOM BOARD—TOP BOARD—BRACKETS—FRONT—UPRIGHTS — CROSS-RAILS — MUSIC-STAND — ITS CONSTRUCTION—FALSE BASE—COAL-BOX AND RECEIVER—DROP-HANDLE—QUADRANT STAY—FINISHING.

THIS piece of furniture I introduce to amateur carpenters as a novel design concerning the combination of the coal-box and music-stand. The plan on which the former is made is not new, though I believe the manner of fixing the coal-receiver and the front is not common, and more simple than hanging the coal-box to the sides by means of swivels or swing joints. However, this does not much concern the amateur, providing he can get a design that can be worked out with comparatively little difficulty.

This particular piece of furniture is very easy to make, and yet, if carefully put together and nicely finished, is a very creditable article for either dining or drawing-room—in fact, anywhere where the piano may happen to be, as it naturally would be in a room where there is also a fireplace. One is apt to connect the piano with music when speaking generally, though, of course, it is not necessary to have a piano to have music; but this is drifting away from my subject, and I will call my readers' attention to Fig. 1, which shows a general view of the furniture in question.

The measurements are as follows:—Bottom board, 18 in. long by 14 in. deep, of ⅝ in. or ¾ in. wood. Sides of box, 2 ft. high by 12 in. wide, ¾ in. thick; the top board 21 in. long, 13 in. wide, ¾ in. thick. The wood used would possibly be one of the following:—oak, mahogany, walnut, pine, or ordinary deal. Personally, I don't aspire to either of the first three-mentioned, as a rule; first, because of the expense, and secondly, because I am not a good French polisher. Nor do I think, from my own experience, that many amateurs are; and such woods to look really well, and to repay for the cost, require polishing, so I generally stick to yellow pine when I want a natural coloured wood, and varnish it well; or common deal when the article is to be painted or enamelled, and so think the question of the material to be used must be left open, to suit the taste and pocket of the amateur.

The sides are fixed to the bottom by screws from underneath, and should have a clear space of 13½ in. between them, and also leave a margin of 2 in. of the bottom board in front. This will bring the sides flush with the bottom board at the back, the idea of the margin in front being to prevent the possibility of the furniture tilting forward when the coal-receiver is pulled out for use (see Fig. 2), to which I will refer again later on. The top board, A, is screwed on to the sides in like manner, overlapping them in front 1 in., and each side about 3 in. Four fancy brackets, 4 in. by 3 in., as shown supporting the top board, are more for finish, so need not be fixed very firmly; ½ in. wood being used for these. The front of box must be of substantial thickness—certainly not less than ¾ in., as it will have to stand the weight of the coal-receiver, and should be "made up:" by which I mean, not cut out of a single board, but having two uprights and two cross-rails. The uprights are 4 in. wide; the cross-rails 6¼ in. This will leave an open space in the centre, measuring 11⅓ in. by 5½ in., to be filled in according to fancy. A good plan is to get a hand-painted tile, 12 in. by 6 in., or two 6 in. fancy tiles of some delicate tints, letting them into a rebate at the back ½ in. deep, the space admitting of a ¼ in. margin on all sides.

The uprights and cross-rails are, I need hardly mention, mortised and tenoned; and every amateur will know how to set about this who knows anything at all about carpentering, so there is no occasion to go more into details. And in making the front, or door, as I shall call it, it is as well to let it be full large, so that when fixed together it can more easily be squared up and fitted into its place, two thin fillets being screwed to the sides of the box for the door to shut against. Two strong brass hinges, 2½ in. long, are next let into the bottom edge of the door, so that they are flush with the surface when shut together (the knuckle edge being outwards); then screw them on to the bottom board, and this must be done before the back is fixed on. The back is of ⅜ in. wood, the grain running horizontally, and screwed on to the sides at back. Referring again to the door, the width of the uprights and cross-rails if left plain would sink the centre panel into insignificance, so I found a fancy moulding, 1 in. wide, mitred at the corners, and fixed on about 2 in. from the sides, and 3 in. from the top and bottom, greatly relieved the flat appearance, the moulding being fixed on with thin glue and needle points.

So much for the coal-box; but before proceeding to explain the music-stand I offer a suggestion for a false base, should the amateur consider the furniture not high enough, as it will not be higher (as shown) than about 3 ft. 9 in. In Fig. 3 I give a plan for a false base, which can be made up as follows, after the sides have been fixed to the bottom board:—Prepare three pieces of wood 4 in. wide, one piece ¾ in. thick, two pieces 1 in. thick, of sufficient length to form the front and two sides; and as the corners are mitred, this must be allowed for when cutting out the pieces. In Fig. 4 I give a section showing how the base is made up. First, a piece (A) ¾ in. thick, with the front edge rounded, is screwed on to the

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bottom board; B is 1 in. thick, with front edge hollowed and screwed to A; C, 1 in. thick, front edge rounded and screwed on to B. All screw-holes to be well countersunk, so that each piece screws flat against the other, having the appearance of a solid moulding, and all corners to be mitred. By referring to Fig. 4, it will be seen that the base projects slightly beyond the bottom board of coal-box. I have recently fixed a base of this sort to mine, and am pleased with the result, so that I think others may feel inclined to do likewise. The lining for the coal-box or coal-receiver I will refer to further on, and proceed now to explain the top part for the music-stand; and in so doing I must refer my readers to Fig. 5, which shows the uprights, that are the main and sole supports for the shelves and side pieces. The uprights are 1 ft. 9 in. long, of $\frac{3}{4}$ in. stuff, $1\frac{1}{4}$ in. wide, the front edges being beaded, and a groove, $\frac{5}{16}$ in. wide, $\frac{1}{4}$ in. or $\frac{3}{8}$ in. deep, cut down the centre. This is done by the aid of the "plough;" but in the event of the amateur not possessing this particular plane, a simple method is to get a marking-gauge, and set it so that when marking from both edges of the wood it will leave a space of $\frac{5}{16}$ in. wide in the centre. Then lengthen the marker, and by filing it flat, like the head of a spear, it will form a cutter sufficiently good to cut in the required depth; then, of course, a $\frac{1}{4}$ in. chisel will take out the centre. The uprights should then be screwed to the *back* of the top board, A (Fig. 1), 1 in. from either end; but, before fixing them, grooves should be cut in the top board to correspond with those on the uprights, and in a line with the same, for the side pieces, B, to fit into; and should be 9 in. in length. These grooves can more readily be cut out with a chisel, as they are "cross-grain." The shelves and side pieces should next be cut out, the former being of $\frac{3}{4}$ in. wood, the latter $\frac{3}{8}$ in. thick. Shelf E, the lower one, is 21 in. long, 10 in. wide; shelf D, the top one, 1 in. less in width. These are grooved on both sides, to take the side pieces. The grooves underneath shelf E are 9 in. long; the grooves between the shelves that hold the side pieces, C, are 8 in. long; and those on the top shelf, for the side pieces, H, are 7 in. long; all grooves, of course, being in a line with those on the uprights. The side pieces, B, are 8 in. high, when fitted, so should be cut $8\frac{1}{2}$ in. by $9\frac{1}{4}$ in. long, to allow for letting in; and those marked C are 7 in. high and 8 in. long when fitted, taking care that the grain of the wood is vertical. The top side pieces, H, are cut out to match the four brackets under the top board, A, and the height of them can better be judged after the shelves and other side pieces are fixed, the latter being glued into the grooves; and the former, in addition, should be strengthened by screws through the back of the uprights. The back, G, only extends down as far as the top shelf, and can be of thin wood, say, $\frac{3}{8}$ in., which is screwed on to the uprights at back, the top corners being level with the tops of the uprights, the points in the centre about 3 in. higher. A moulding or beading, $\frac{3}{4}$ in. wide and $\frac{1}{2}$ in. thick, makes a finish for the back, and is fixed on by screws from the back. The knobs on the top of the uprights can be of wood or metal; but should the amateur not possess a lathe, he can get some very effective brass knobs, such as are used at the ends of picture-rods. And, in conclusion, I would suggest that all edges showing which are drawn as square should have a beading on them, which is easily done with the "bead-router" so much advertised. The beading helps to relieve the appearance where the wood is required to be thick—such as the shelves, for instance—for, being intended for sheet or bound music, they have to stand a good weight if full. To prevent the music slipping through at the back, three laths, 1 in. wide and $\frac{1}{2}$ in. thick, should be screwed to the shelves and top board, A, at the back; and they also help to strengthen the stand.

I now refer the amateur to Fig. 2, which is a section of the coal-box, and shows position of the coal-receiver when pulled out for use. The receiver should be of the following size (strictly *outside* measurements):—Height at front, 18 in.; ditto at back, 15 in.; width, $11\frac{1}{2}$ in.; back to front, 10 in. This, of course, can be made of wood, but I would strongly advise the amateur to get one made in galvanised iron, as there is no fear of rust through wet coal; and an iron one will last a dozen wooden ones. It is hung on to the door, and should have two holes cut in the front, as shown in Fig. 6, the same shape as mirror-plates, so that it can be easily taken out, if required, for filling. Two drop-handles of iron wire should be fixed on the sides, either in or outside, for the purpose of lifting. Two stout round-headed screws, 1 in. long, are fitted in the door as far as they will go without appearing through, and the receiver hung on these. To hold the door in a proper position when opened to get the coal out, what is known as a quadrant stay should be fixed on one or both sides, if necessary. I endeavour to explain what I mean in Fig. 7, and the amateur will probably have to get it made either in brass or iron. The plate A is a fixture on the stay, and is screwed to the door; the plate B is a guide for the stay, and is screwed to the side of the coal-box. The end of the stay is turned up slightly to form a stop, and this coming against the plate B will prevent the receiver from coming out too far. So

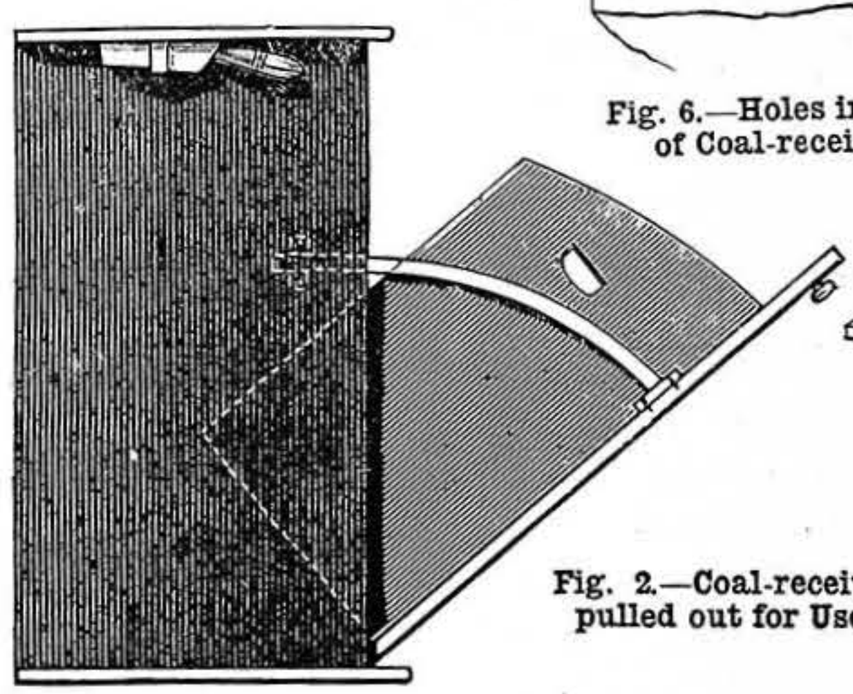

Fig. 1.—General View of Coal-box and Music-stand.

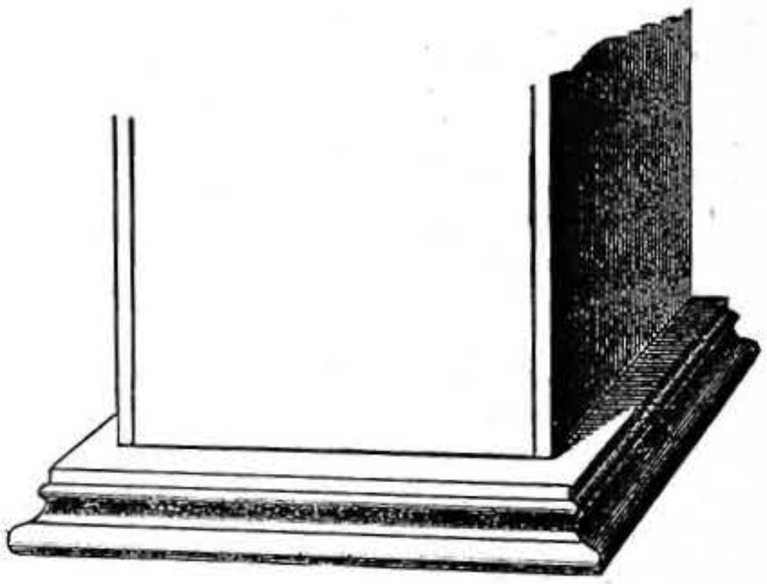

Fig. 3.—Plan for False Base.

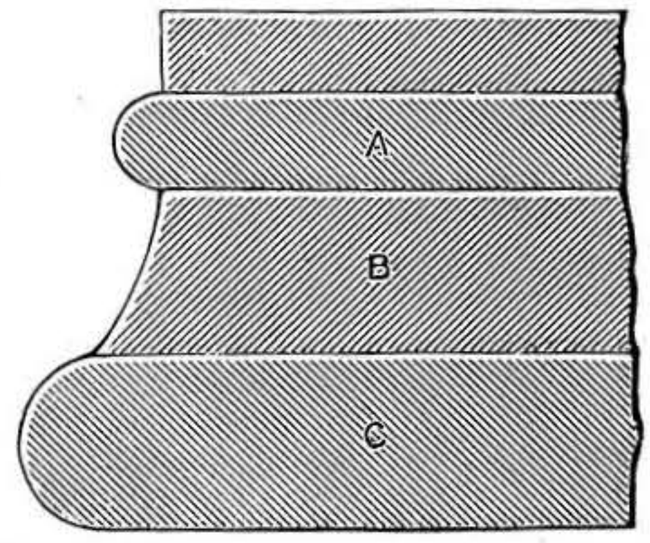

Fig. 4.—Section showing how Base is made up.

Fig. 2.—Coal-receiver pulled out for Use.

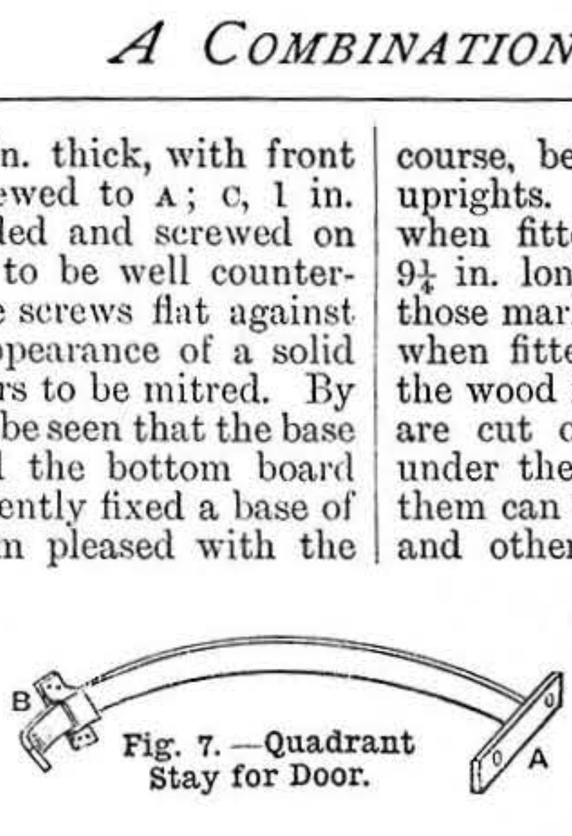

Fig. 7.—Quadrant Stay for Door.

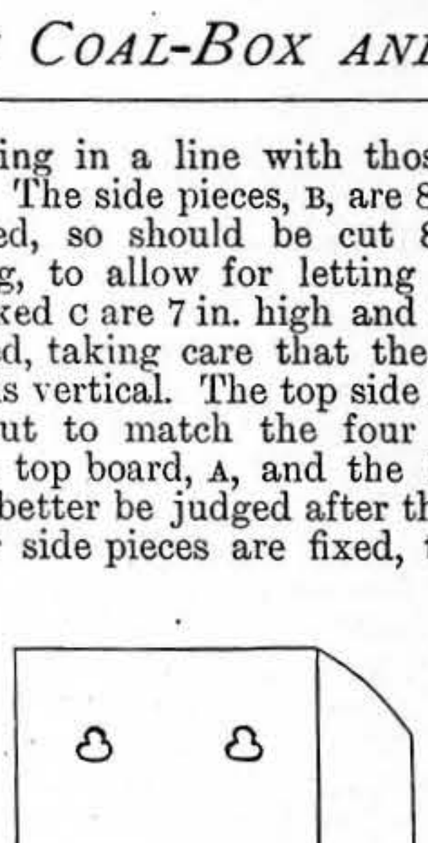

Fig. 6.—Holes in Front of Coal-receiver.

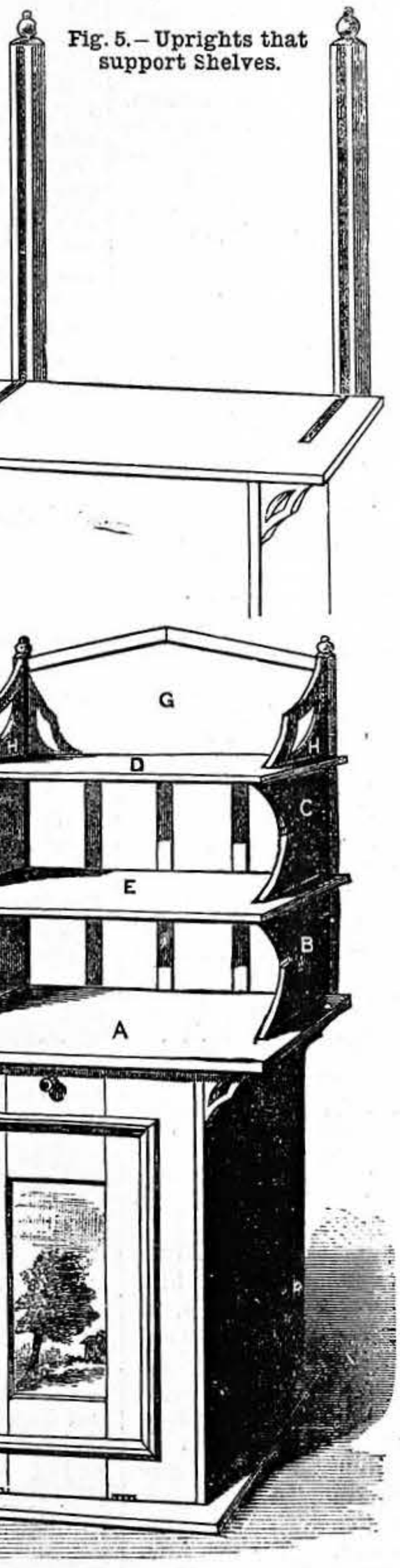

Fig. 5.—Uprights that support Shelves.

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in case of two stays being used, they must be handed—*i.e.*, one right and one left hand. A small piece will have to be cut out of the fillets on the sides, to allow for the stay moving in and out; and there is a space of 1 in. allowed either side, between the receiver and side of coal-box, for the stays. A strap of brass or hoop-iron screwed inside to the top board will hold the coal-scoop; and this, I think, completes the handy piece of furniture, with the exception of a small brass knob to open the door with. The weight of the receiver and its contents will be sufficient to keep the door closed. However, a small spring catch could be fixed on the top edge, if thought necessary. As to the finish, this will entirely depend upon the kind of wood used, and also upon the taste of the amateur; but I offer two suggestions. If made of yellow pine, which can be obtained nearly or entirely free from knots, a good way is to size the wood, and when dry, sand-paper it well, being careful to remove any roughness; then put on a coat of best copal varnish (dark oak), and when it is hard, sand-paper again, and apply a second coat. This will have the desired effect of giving a fine bright surface, and will show up the grain of the wood. I have done this with other pieces of furniture that I have made, with good results. I don't recommend spirit varnishes at all; they are cheaper, but not lasting. If ordinary deal has been used, the best plan is to enamel the furniture, but first it should be primed with a coating of white lead, turps, and a little red lead to harden it. This soon dries, and should then be sand-papered, and a coat of ordinary paint put on, consisting of white lead, turps, boiled oil, and a little driers. If the amateur mixes his own paint, he should always strain it through some fine netting or similar material; otherwise, it will not leave a smooth surface. On this the enamel can be put, the colour of which I leave to the maker.

Some of our readers may not care to have the coal-box surmounted by a music-stand, being unable to play. Under such circumstances a small revolving bookcase, or set of bookshelves that can be turned to suit the need of the owner, might be substituted for the music-stand, being extremely simple in construction and easily made, or the top might be finished to form a box-table, after the manner of the pretty little box-table described in a recent number of WORK If these are not liked a newspaper rack could be placed above the coal-stand, or the pedestal may form a stand for a bust, or be utilised as a jardiniere.

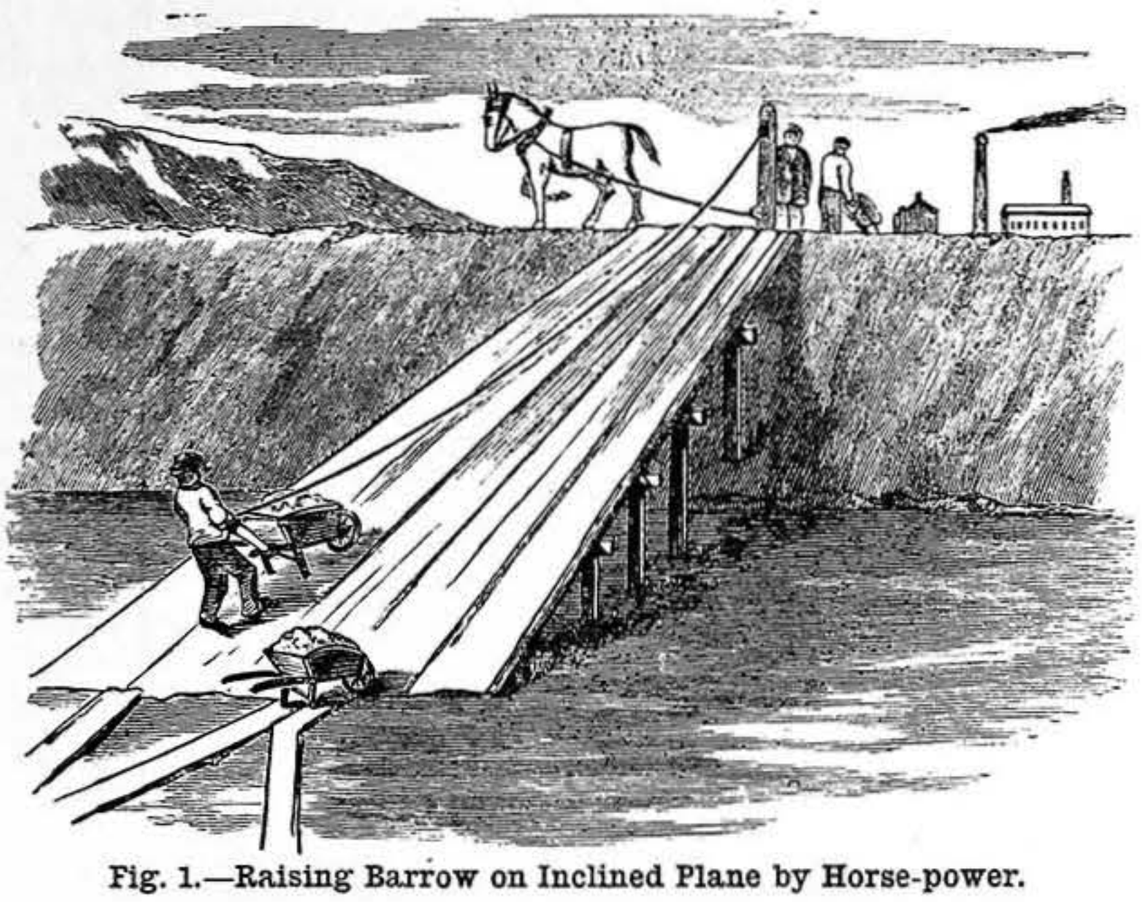

Fig. 1.—Raising Barrow on Inclined Plane by Horse-power.

LABOUR-SAVING APPLIANCES ON THE MANCHESTER SHIP CANAL.

BY P. B. H.

MOST of the readers of this paper will have come across descriptions of, if they have not seen, the large American diggers, which, with two scoopsful, load a contractor's waggon, or the powerful steam excavators, both German and French, which are incessantly at work on the above vast undertaking, now happily nearing completion, and which save such a vast amount of manual labour. In fact, they save so much that it would have been impossible to have constructed it without their aid. These great machines have been described so often and at such length in so many papers that I shall make no reference to them here. There are, however, in odd nooks and corners various labour-saving devices of a smaller kind, employed where the larger machine could not work, and which I will here endeavour to describe.

One of the first devices I saw, and which I have illustrated, is shown in Fig. 1, where a docile horse pulls the loaded barrow and man up an inclined plane formed of boards laid on temporary staging, the incline from the bottom of the canal to the top of the bank being too great for a man alone to wheel the loaded barrow up it.

One man attends to the incline, the full barrows being brought to him and the empties taken away below, while, on the bank, the full ones are removed and the empties brought to the top. Suppose a loaded one is below; the man slips over the handles a board perforated with two holes for that purpose, and to the centre of which the end of the hauling rope is fastened. The man now lifts the barrow in the ordinary way, but, instead of pushing it, he has only to hang on and guide it while both are drawn up by the horse, which starts at the word of command, and stops when it feels the tension on the rope diminish by the load reaching the top; it then turns round and walks back to the starting-point ready for the next load. The man now removes the board and hauling rope to one of the empties and proceeds, generally by sliding to the bottom of the incline. Should his velocity increase beyond safety pitch, the boy at the top puts the brake on the rope, which passes from the barrow over the pulley in the top of the post, then down to a swinging pulley near the ground, and then to the horse. It is really wonderful to see how expeditiously the work is done.

In certain cases hand-carts were used instead of barrows on these inclines; the proceedings were otherwise the same as in the preceding case.

A somewhat similar plan is used for raising the building materials for some arches in course of construction which had almost attained the necessary height of some seventy feet above the surface of the canal. In this case the rise is vertical, the rope passing from the horse round the swinging pulley at the bottom of the scaffolding, up over the pulley on derrick, and down to the floor, where it is fixed on the barrow, which the horse, at a word of command, immediately hauls up to the top. The man on the building seizes hold of it and draws it inwards as the horse backs a few paces to allow the load to descend. The horse now quietly turns round and proceeds to its starting-point. It may here be noted that in all cases where the horse is used the feeding-trough is placed across its path to mark its limit, but even with this they seem almost human from the manner in which they obey the word of command, starting, stopping, backing, turning, and walking back to the starting-point with the utmost precision.

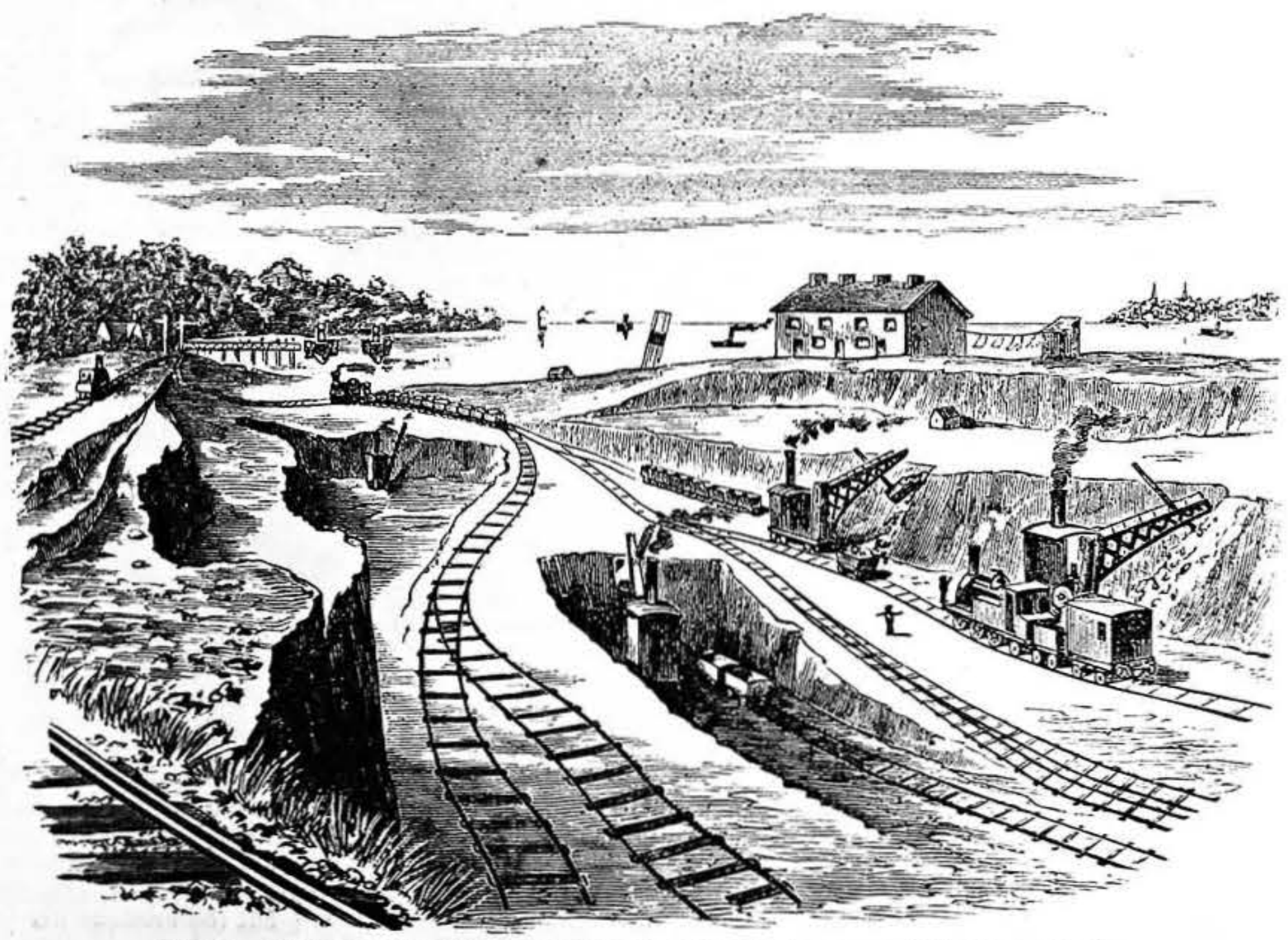

Fig. 2.—Mode adopted in excavating the Site of the present Eastham Locks.

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Near some of the arches under construction there was a locomotive steam crane employed for lifting the blocks of granite for the masons. This, when not in use for them, was employed as an auxiliary to the horse in the preceding case for raising the barrows, which it did by travelling along its pair of rails with the end of the rope hooked to it.

Where material had to be raised a short distance and then taken further away to some other spot, the hand-carts or barrows were wheeled on to horizontal platforms, worked in pairs, travelling on inclined rails, one ascending while the other was descending. In this case the platforms were raised and lowered by a small steam engine.

Fig. 2 shows the excavations in progress, but taken some time ago, for the Eastham Locks, which have been lately completed and opened for traffic. The view is taken looking in the direction of Liverpool. The full depth is not yet reached in sketch even in the lowest pit shown.

The above are only a small proportion of the many devices in use, among which are concrete-mixers, a vast quantity of which is used. There are steam pumps, engines, and locomotives innumerable, and I should strongly advise anyone in the neighbourhood to pay a visit to this gigantic work.

OUR GUIDE TO GOOD THINGS.

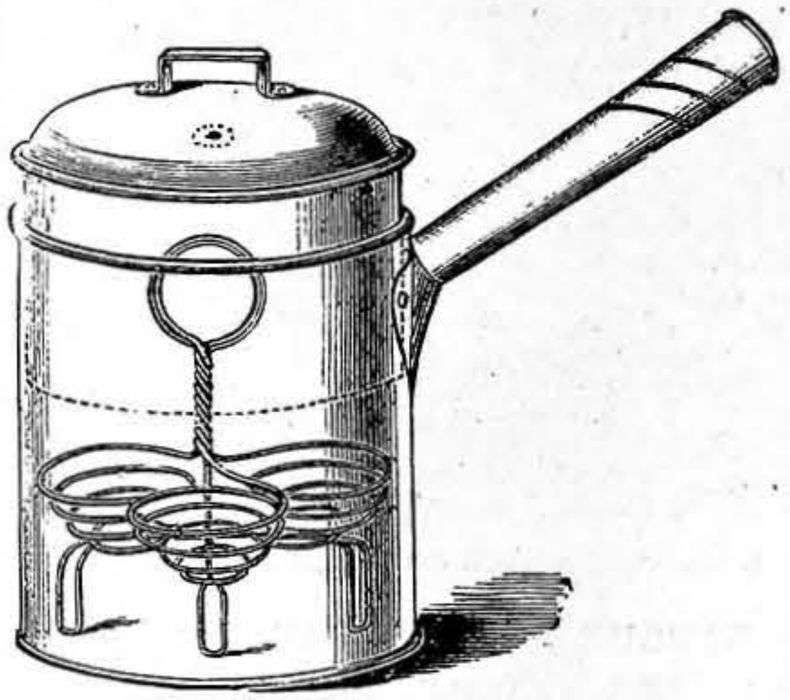
**** *Patentees, manufacturers, and dealers generally are requested to send prospectuses, bills, etc., of their specialities in tools, machinery, and workshop appliances to the Editor of* WORK *for notice in "Our Guide to Good Things." It is desirable that specimens should be sent for examination and testing in all cases when this can be done without inconvenience. Specimens thus received will be returned at the earliest opportunity. It must be understood that everything which is noticed, is noticed on its merits only, and that, as it is in the power of anyone who has a useful article for sale to obtain mention of it in this department of* WORK *without charge, the notices given partake in no way of the nature of advertisements.*

63.—Planner's Patent Signal Egg Saucepan.

Not a very important kitchen utensil, perhaps, is the Patent Signal Egg Saucepan introduced by Messrs. H. G. Planner & Co., 1, Arthur Street East, London Bridge, E.C., and supplied by the inventor, Mr. Planner—who was for many years with Messrs. Deane & Co., the well-known ironmongers near London Bridge—or by any ironmonger or hardware dealer, at 1s. each, or 1s. 3d. post free. Its lack of importance, however, is counterbalanced by its great utility and unerring action, and the trouble it saves to all who boil eggs by its aid by saving them the trouble of watching the clock to see when they have been boiling for the regulation three minutes, or three minutes and a quarter, as some prefer to have it. The construction of the saucepan may be seen from the accompanying illustration. The eggs are put in the holder and deposited in the saucepan; just sufficient cold water is put in to cover the eggs, the deep-rimmed cover is put on, and the eggs are left to boil. Do not put in more than enough water to cover the eggs, for on this depends the generation of just sufficient steam, when the eggs are ready for table, to sound the whistle by the rush of steam through the hole in the lid, and declare the eggs as done. It should find a place in every house.

64.—The "Apollo" Picture-cord Grip.

The "Apollo" Picture-cord Grip is another useful invention, patented by Messrs. Smith and Davies, 9, Acton Road, Harlesden, London, N.W. I am unable to give the price, but this may be easily ascertained by writing to the patentees. The construction of the grip may be seen from Fig. 1 of the accompanying illustrations. From a substantial brass back plate projects a kind of box, whose interior is hollowed out in such a manner that the sides of the interior are slanting and slightly closer at the top than they are at the bottom. In this hollow or slot a couple of jaws are placed, grooved on the inner surface and slightly roughened to retain a better grip on the picture-cord when placed between them. The jaws are then held in position by a plate screwed across the opening, as



Planner's Patent Signal Egg Saucepan.

shown in Fig. 1. The jaws are furnished with flanges projecting laterally and in opposite directions from the top of each to prevent withdrawal from the box-like cavity when a downward pressure is exerted on them, and the left-hand jaw has a similar projection at the foot, which acts against the bottom of the other jaw and brings it up with the jaw to which it is attached when an upward pressure is applied. The grip is fastened on one side of a picture in the position shown in Fig. 2 by a screw through a hole made to receive it in the bottom of the back plate, and if the picture be large and heavy, another screw may be placed through the slot visible at the head of the back plate in Fig. 1. One end of the picture-cord is tied to an eye screwed into one side of the picture in the usual way, and the other is placed downward through the jaws of the grip. When the weight of the picture is thrown on the cord the jaws are drawn upwards and forced together by the pressure of the bevelled sides of the box on the similarly bevelled

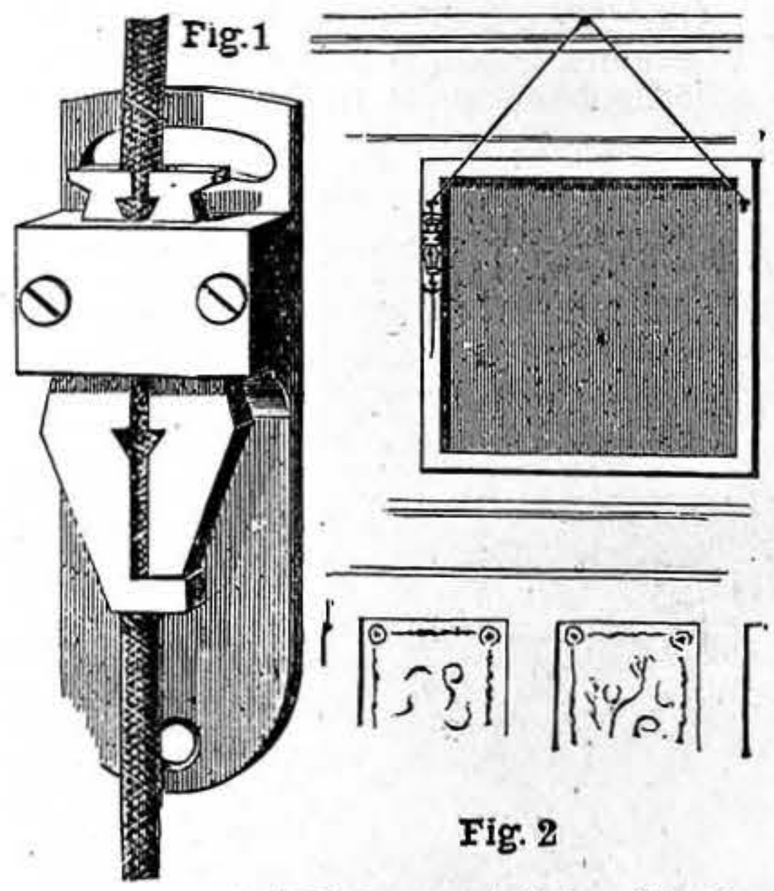


Fig. 1.—"Apollo" Picture-cord Grip. Fig. 2.—Mode of Attachment to Back of Picture.

sides of the grip. If it be desired to adjust the picture, or raise it or lower it, as is often the case, all that is needful is to raise the picture with the left hand so as to take the weight off the cord, and then with the right hand to manipulate the cord until the desired height is ascertained. It is in this ready regulation of the height of pictures that the "Apollo" Picture Grip becomes doubly valuable.

65.—New White Developer.

Mr. G. W. Secretan, 210A, Tufnell Park Road, N., has sent us a sample of his "New White Developer," which we have tried, and find it well bears out his statements as to its value for developing snap shots and rapid exposures generally, and giving a good, clear, and brilliant image. In these days, when hand-cameras are so much in fashion, such a developer is, undoubtedly, a great acquisition. It can be used repeatedly, retaining its clearness and active properties for some time; of course, gradually becoming slower in its action until exhausted. Being in one solution, requiring only dilution with water, is much in its favour, simplifying the process, and ensuring a proper working solution without any trouble. We can recommend it to our readers with every confidence. It is sold in half-pint bottles at 1s. each. He also sends us a specimen of Dunmore's "Unique" Black and White Cloud Negatives, for which he is agent. These clouds are extremely delicate and rapid printers, and no two are alike, and are very effective. When added to landscapes where the sky would otherwise be a blank space, they have a wonderful realistic effect, and their price places them within the reach of all. For the future we should not see so many landscape pictures destitute of clouds. The Editor.

SUGGESTIONS FOR WORKERS AND HINTS TO INVENTORS.

Hydraulic Propulsion.—The substitution of the screw or paddle by some method of hydraulic propulsion is still engaging a good many minds, and has recently been much discussed at the meetings of engineering societies, etc. We do not deem it likely that the speed hitherto attained of nine miles per hour is ever likely to be exceeded with the existing form of sea-going hull. But for extremely light draught steamers, such as are necessary for some of the tropical and Australian rivers, the fact that the machinery could be placed in any convenient position would be a distinct gain. Very light draught, again, would permit of a much higher rate of speed being attained in proportion to the power, while it, of course, entirely precludes the use of a screw and is not advantageous to a paddle-wheel. Breadth, too, has often to be taken into consideration in tropical river navigation, so that, on the whole, an effective hydraulic propulsion engine has a field open to it. The existing patterns must, however, be improved on, if the engine is ever to be adopted even for the restricted uses above specified.

Sheet Iron in Castings.—Some few of our readers do their own casting, and a yet larger number have castings made for them when fitting up small engines, etc., in their amateur workshops. It may interest them to know that American iron founders are adopting a simple system of strengthening castings, which renders them practically unbreakable either by extreme changes of temperature, such as sometimes occur in stoves, or by an accidental blow. This consists in placing sheet iron in the centre of the casting, even ¼ in. oven plates being found to be rendered safe against fire by this protection. It is estimated that a plate thus prepared possesses six times the strength of one cast without a sheet-iron core. As the breakage of brass castings is also an occasional source of annoyance, especially when they have to stand heavy jerks and strains, such as come upon boat-cleats, crutches, hooks, etc., it would seem worth experiment so as to ascertain whether they could be similarly strengthened.

Rapid Printing of Stereos.—A direction in which inventors could usefully set their brains to work is that of a rapid process for printing engraved blocks or stereotypes. The output of an illustrated journal is restricted by the fact that printing it by means of the continuous web has as yet been found impossible, and that the reciprocating motion has therefore to be adhered to. It certainly does not seem as if human ingenuity were unable to overcome the difficulty; but the machine has yet to be invented.

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SHOP:

A Corner for Those who Want to Talk It.

*** *In consequence of the great pressure upon the "Shop" columns of* Work, *contributors are requested to be brief and concise in all future questions and replies.*

In answering any of the "Questions submitted to Correspondents," or in referring to anything that has appeared in "Shop," writers are requested to refer to the number and page of number of Work *in which the subject under consideration appeared, and to give the heading of the paragraph to which reference is made, and the initials and place of residence, or the nom-de-plume, of the writer by whom the question has been asked or to whom a reply has been already given. Answers cannot be given to questions which do not bear on subjects that fairly come within the scope of the Magazine.*

I.—Letters from Correspondents.

A Lathe Wanted.—J. B. (*Leeds*) writes:—"There are lots of things I should like to make, and could make, if I had a lathe. I have saws, chisels, and gouges, but I want to do some turning. I noticed that in Vol. I. of Work, page 444, under the *nom-de-plume* of Stoker, and under the heading of 'An Opinion of Work,' a writer says he has made a lathe, and the materials in it only cost him about 4s. 6d. I should be very glad if Stoker would kindly enumerate in Work the materials which only cost him that amount."

Elizabethan Twist in Lathe.—C. C. E. (*London*) writes:—"With a polite letter I have received from W. P. W. the specimen of work proffered on page 270. It is simply a double stranded spiral cut with a ¼ in. hollow drill, in no sense an Elizabethan twist, which may be described as a cylinder wound round an imaginary axis, the pitch of which may vary as you please, but the section is always circular."

Saws and Lathes—Erratum.—A. R. (*Scorrier*) writes:—"In my reply to A. C. (*No Address*) (see No. 125, p. 332), the passage halfway down should read: 'A machine with two belts will clean up from fifty to sixty spokes per *hour*,' not per minute."

Fret Machine.—North Jack writes:—"Will you please note that in Fig. 2 (see Work, No. 58, Vol. II., p. 91) the measure given is shown from top of foot to underside of table board, while it ought to be from the floor line to the top of table. The figures 1 ft. 7 in. should be 17 in., thus making the distance from floor to top of table 2 ft. 7 in., as given in Fig. 1. Also, that the distance between the uprights is 18 in., not 1 ft. 8 in. (see Fig. 1); and the table board is 23 in., not 2 ft. 3 in. The side bearing pieces are given too short in the timber list."—[You and all other correspondents submitting intricate drawings, involving such an array of figures as is contained in your fret machine and its parts, should be careful to indicate very clearly what dimensions, etc., are really intended.—Ed.]

Water Glue.—J. B. (*Poole*) writes:—"I have tried this, and do not think it can compare with Le Page's fish glue for strength of joint; it also has the disadvantage of showing a line of colour at the joint darker and thicker than other glue. Nevertheless, being waterproof, it is a useful adjunct to the workshop."

Brush-making by Machinery.—W. B. (*Huddersfield*) writes:—"As a journeyman brush-maker I should esteem it a favour if you would give us some particulars on brush-making by machinery."—[I shall be glad to receive on approval any paper on "Brush-making by Machinery."—Ed.]

Birmingham Punch Trade.—W. B. (*Huddersfield*) writes:—"If at some future time a chapter could be given to the Birmingham punch trade, I think it would be of considerable interest to many readers of Work."—[I shall be happy to hear from any reader who can write on this subject.—Ed.]

II.—Questions Answered by Editor and Staff.

Bear on Pole.—Olrac.—Your own common sense should tell you that if the bear is, as you say, constantly facing the man who walks round the pole, he is not going round the bear.

Bookcase and Chiffonier.—F. N. (*Manchester*).—If you purchase the Index to Work, Vol. I., and that to Vol. II., you will find several designs which, with no great ingenuity, may be adapted to your requirements.

Protection Stamp.—Higgins (*Altrincham*).—The Government stamp on a provisional protection costs only £1. Duplicate specifications must, however, accompany this proper stamped form, and all must be done in strict accordance with the Patent Office regulations. A patent agent's usual charge for obtaining such protection is £3 3s. to £4 4s.—R. & C.

Watch-making Tools.—Makers' names and addresses have frequently been given in "Shop." Consult the Indexes of Work, Vols. I. and II.

Draughtsmanship.—Dewdrop.—This subject will be treated in Work shortly.

Umbrella Silk.—M. A. H. (*Richmond*).—Consult the London Directory for wholesale silk merchants. Any one of them will supply umbrella silk.

Basket-making.—J. K. (*Middlesbrough*).—When I receive papers on the subject they will appear. I await the convenience of the practical hand who offered to write on this subject, and whose offer was entertained by me. You may lead a horse to the water, but, as you are probably aware, you cannot make the said animal drink. In the same way you may accept proposals for articles, but you cannot make the proposers write.—Ed.

Camera and Banjo.—D. M. S. (*Glasgow*).—Purchase the Index to Vol. II. of Work, and you will find much upon cameras and banjoes.

Glass Shades.—R. S. S. (*Trevor*).—Glass shades can be procured of Messrs. James Powell & Sons, Whitefriars Glass Works, Temple Street, London, E.C. They have one very nearly the size you want, viz., 21 in. high, by 38½ in. by 13½ in., and which they quote at £4 10s., less discount for cash. If this would suit you, it would, I think, be much cheaper than having one specially made; I would advise you to correspond with them. I may say, for the benefit of those interested in electricity, that the above firm supply glass jars for Wimshurst induction machines.—W. E. D., Jnr.

Indiarubber Stamp Making.—E. P. B. (*Penge*).—A paper on this subject will shortly appear.

Violin Varnish.—R. O. B. (*Edinburgh*).—Write to Mander Brothers, Wolverhampton; they will be able to supply you, or at any rate direct you to one of their agents who will do so. Several articles on violin making have appeared in the present volume.—B.

Weights of Galvanised Iron Sheets, etc.—Old Subscriber.—A sheet of 24 gauge (6 ft. by 2 ft.) galvanised iron will weigh 14 lbs. or thereabouts; 22 gauge 17 lbs., and 20 gauge 19 lbs. You would not want to use much thicker than that, I suppose, though you do not state the size boat you want to build. I think you will have some difficulty in making a boat of this material. The worst thing about galvanised iron is its tendency to peel when seamed or worked, and whenever the galvanising peels off, it will soon rust. The best way is to galvanise articles after they are made, but in the case of a boat this would be rather awkward.—R. A.

Magnetising a Clock.—Kenilworth.—I do not think it possible to magnetise the steel works of a clock simply by connecting the brass frame to a battery and bell, and using it as an electric time alarum. If an electro-magnet is used in or near the clock for any purpose, the steel portion of the works might become magnetised.—G. E. B.

Electric Bell Jumpers.—Amateur Bell Fitter (*Clapham*).—I confess to entire ignorance respecting "electric bell jumpers." Heat the soldering iron by any means at your disposal.—G. E. B.

Sable Pencils, Glass Embossing, etc.—M. T. C. C. (*Belfast*).—Prices of sable pencils (Brodie and Middleton's): lark, 5d.; crow, 7d.; duck, 9d.; goose, 11d.; extra goose, 1s. 6d.; small swan, 2s. 6d.; middle swan, 3s. 3d.; large swan, 4s. 4d. each, post free. To test a sable pencil, wet it in the mouth, put the point upon thumbnail, and twirl round; if it keeps its point it is good, if it opens or splits reject it. M. T. C. C. cannot have read my early chapters on sign writing or he would not have asked this question. I am sorry to say I cannot give any useful information on glass embossing and gilding on glass in this column; it would require several pages to do so. If the Editor thinks fit, I shall be glad to contribute some articles on the subject in the next volume.—H. L. B.

Repairing Silver Umbrella Handles and Collars.—H. L. (*Bradford*).—Very many of these mounts are so extremely thin that it will take a very good workman to make a decent job of repairing them. The way to set about it will be to get the mount perfectly clean, and then to solder it with silver solder. Many details on this matter can be obtained from answers in No. 46, page 732, Vol. I. of Work, and in No. 111, page 92, Vol. III. If these answers do not make the matter clear, then write again, and give me the points on which information is particularly wanted; and also state what you know of soldering. The greatest difficulty is, I think, in getting the solder to run in the seam. Now, if that proves so, then it may be well to put pieces of silver across the seam, or else put a plate of silver on either the inside or outside to help to draw the solder across the join; but in very many cases it is simplest and cheapest to make a new mount entirely. I have not taken pewter solder into consideration, as no good workman likes to use it. If, however, it is to be used, then see that a good-sized plate is made large enough to well cover the join. And it will be better if it be made to form an ornamental addition. For example, if a hole is to be covered, a shield or lozenge-shaped piece would do. If a collar is to be added, then two lines near the edge may improve it, or it may be made into the form of a strap and buckle, etc. etc. Pewter solder is of no use by itself, whereas hard solder amply suffices for this kind of job as a rule. There is a book that gives many details of silversmiths' work. Its name is "The Silversmiths' Handbook," published at 3s. by Crosby Lockwood & Co., but it is intended for those that have already some experience in that kind of work, and would not, I think, help you much.—H. S. G.

Overmantel.—J. H. S. (*Romsey*).—An article describing a dressing-chest is in hand, and will shortly appear. It is one that you would have little difficulty in making after your experience with the overmantels.—D. A.

Converted Fret Machine.—J. L. (*Airdrie*).—Much has appeared in Vol. II. upon this subject. Consult the Index to the volume.

Stripping Electro-plated Coats before Re-plating.—Tommy Heath.—All good workmen strip off old coats of gold, silver, and nickel before re-plating the articles. Although the old coat may look smooth to the eye, it may not be firm, and we cannot be sure of the new deposit adhering firmly to the old deposit. If it is worn away in places quite smooth, those bare places expose the metal beneath, and this will form, with the coat, two elements of a galvanic pair when placed in the plating solution, the result being a loose deposit at the junction of the old coat. Again, let the old coat be worn off ever so smoothly, it will look patchy, and these patches will show distinctly in the newly-deposited coat. The few operators you saw at work at the Crystal Palace and elsewhere had not the conveniences at hand for stripping off the old coat. The operation was performed there for the amusement of the public. I do not find the operation of stripping any more tedious than other parts of the necessary preparation. The whole process is fully described in "The Electro-plater's Handbook," pages 101-104.—G. E. B.

Varnish for Bright Spokes.—K. M. D. (*Harling*).—The best transparent varnish for bright spokes is the Silico transparent enamel, in 1s. bottles, with brush. It is put on with the brush. The best varnish for iron beds is the Club black enamel, 1s. bottles, or 12s. per gallon, wholesale; both the above from the Silico Enamel Company, 97, Hampstead Road, London, N.W.—A. S. P.

Griscom Electro-motor.—T. J. (*Warrenpoint*).—I am sorry to have to disoblige you and other readers of Work, but really cannot see my way clear to describe and illustrate every part of a Griscom motor, in the narrow confines of "Shop," in such a way as to enable you to make one from the instructions and illustrations. This motor is most difficult to make because of its compact form, which necessitates the exercise of more than ordinary skill and patience to wind with wire, and fit with armature and commutator. There are better and even more powerful types of motors in the market, and these will receive my attention at no very distant date, when I may also have something to say about the Griscom type. The Leclanché battery is altogether unsuitable for working a motor. A book on electro-motors is in course of preparation, and will shortly be published.—G. E. B.

Tinting Photographs.—W. T. A. P. (*Portsea*).—There is no method of tinting photographs and opals with water-colours that can dispense with a trained knowledge of colouring and considerable practice, if the results are to be worth looking at. Procure a handbook on the subject and carefully read it; you will then see that considerable knowledge and skill are required to attain a passable proficiency. There are just the same manipulations required for these pictures as for any other. In case the photograph itself is to show and form the shadows, light tints of suitable transparent pigments may be applied. This is probably the most easy method of colouring; especially when the high lights are strengthened by the application of touches of opaque colour to impart solidity of effect. Another method formerly much in vogue was to apply powder colours to the flesh, with a suitable brush or stump, and put a flat tint of transparent colour over the drapery. To make passable pictures by this means did not require much practice; but it can be easily understood that pictures so coloured would bear no comparison with skilful water-colour painting. To give crude directions for tinting, first of all prepare the surface of the print by a wash of oxgall to receive the colour, then proceed to colour the flesh and lighter portions, finally the drapery, using a little gum in the deepest shadows.—E. D.

Platinum Contacts.—F. W. (*Addlestone*).—As the price of platinum has more than doubled during the last few months, and is now nearly equal to that of pure gold, you will get but a very small bit of No. 20 wire for a shilling. I therefore advise you, and other amateur readers, to use platinum foil for contact points, instead of platinum wire. A tiny piece can easily be soldered on to the tip of a screw, and will last a long time.—G. E. B.

Pocket Accumulator.—S. G. V.—(*Boro'*).—As I described these in my series of articles on "Model Electric Lights," I will not take up the valuable space in "Shop" by repeating the description, but must ask you to be good enough to refer to those articles.—G. E. B.

Frame Gilding.—G. A. H. (*Stockport*).—Smooth your frame free of dust, and give it a couple of coats of gilders' clay; when dry, brush over with gilders' oil of gold size, and let it remain for about twelve hours, when it will be found just tacky; put your gold-leaf on with gilders' tip, and dab down with cotton wool. When dry, go over work with clear size; when this is thoroughly dry, it is ready for picture.—G. R.

Adjustable Rebating Cutter.—M. E. M. (*Heywood*).—The little tool mentioned in Vol. I., page 301, will do very well for cutting the rebate in an "oval picture frame, photo size."—Ed.

Ferrotype Photography.—Fellows.—There are numerous one shilling handbooks published on the wet process. One by J. Wergo, of Berners Street, is perhaps as good as any. Any bookseller will supply them. The "Ferrotype" process only

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differs from the glass process in respect of the material on which the collodion is spread—glass in one case, and enamelled iron plate in the other. Ferrotype plates being opaque, do not require backing as glass plates do, otherwise the finishing is precisely the same.

Wood Carving.—"UT SPES NON FRACTA."—Unless you are by trade a wood carver, or have a thorough knowledge of the art, there is no way in which you can earn money by it, as there is little demand for any but the best work. You might refer to WORK, Vol. II., Nos. 61 and 74, and try what you can make at "chip" carving, which is the easiest form of work, but I doubt whether you would find much of an opening in that way.—M. E. R.

Polishing and Mounting Horns.—PIP will find directions for polishing horns in Vol. II., page 410, No. 79. As regards mounting, he might cut out an oval in 1 in. board, cover it with plush, and screw the horns upon it.—M. M.

Labels.—J. G. N. (*Manchester*).—You should advertise in our "Sale and Exchange" column.

Cyclometer.—H. C. S. (*Ipswich*).—I am practically unacquainted with the mechanism and movement of the cyclometer; further than that, it is an instrument for measuring the distance travelled by the machine. They are now greatly improved, and can be adjusted to any size of wheel. The instrument is fastened to the revolving shaft of driving wheel, and every revolution produces a click which is indicated on the face-plate similar to a gas-meter. There are numerous different makes of the instrument, and I should think that unless your correspondent is a watchmaker or a working optician, the job would be too much for him; at any rate, he would need to have one to copy, and I rather think the parts could not be procured from a maker. The instrument can be bought at prices from 17s. 6d. to £2 2s. The "Signal" cyclometer is sold at 30s., and can be had of Wilkins & Co., 66, Holborn Viaduct, London, E.C.

Setting out Dulcimer-Blocks.—G. A. (*Parkhead*).—I expect you have worked your stuff to the full dimensions given, and consequently your back edge, including the moulding, measures 1¼ in. I intended to convey in my paper, when giving thicknesses, those usually accepted when speaking of them. Thus, ¾ stuff is ¾ stuff less the saw mark, and this, when planed on both sides, would be not more than ⅝ in. Again, it is recommended to make the moulding from "a piece of inch stuff rounded up and divided into four lengthwise." These, when cleaned, would not be more than ⅝ in. thick, which would leave the back about 1 in. in thickness, and allow sufficient room for the top strings. However, it will be easy for you to allow ½ in. more at top in "setting out," and this should give you ample room, and the difference divided by 20, the number of notes will not be appreciable.—R. F.

Clock Wheels.—WATCHMAKER.—I am sorry to say I cannot give any information how to cut out a clock wheel from sheet brass. As a rule, I believe, they are cast and then filed out to finish. When I was an apprentice I know we used to get them in blanks cast—that is, just like your drawing. We used first to well hammer them to harden, then drill a hole in the centre, turn them down to size, and make a circle width of band, allowing for teeth; then finish crossing out, and cut the teeth. I would advise you to do the same. Send to the tool shops for the sizes you require, or you could get them already cut with the teeth and ready, with a little filing at the crossings to mount; or drill a hole at each corner of the crossings, and punch out roughly with a keen chisel and finish off. I wish I could give you an idea how to make a die or stamp, but I doubt if you could make it pay unless you went in for making them wholesale, as you would require powerful machines to do what you require.—A. B. C.

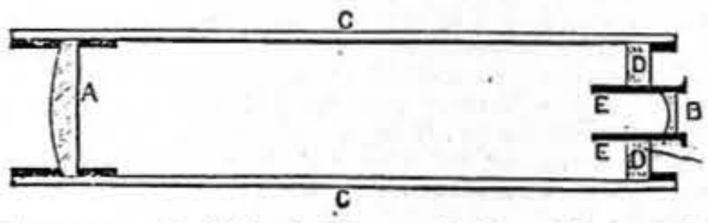
Fixing Brass Plates.—NAME-PLATE.—I gather from your letter that you are compelled to rivet your plates on the machines. Would not round-headed brass bolts, secured in rear or beneath, do as well as riveting? and which would look far more workmanlike. Another way would be to send the part of the machine on which the plate is riveted to the engraver, who would do his work as usual. The other alternative is to take a graver and cut out all the old spoilt wax, grind up some wax with gold size till liquid enough to run freely, fill the letters, and clean off when dry with spirits of wine. You will, perhaps, gather some further information from "Engraving on Metal," which appeared in Nos. 33, 33, 43, 45, and 48, Vol. I.—N. M.

Japanese Stencils.—M. S. (*Todmorden*).—I tried at the chief shops for Japanese stencils in vain; they were all out of them. Should I succeed in finding the address of a salesman, I will let you know in the pages of WORK. To cut them accurately would be less easy than to trace a design on your enamel (with carbonic paper) and paint it neatly by hand; so that unless you can come across the real thing, I fear you must be content to wait. If the Editor of WORK has room for them I would allow him to reproduce some I have belonging to me.—E. B. S.

Chemicals for Portraits.—J. D. (*Bethnal Green*).—Your best plan would be to purchase some elementary work on photography—say Burton's "Photography for Beginners" (1s.). You would then see what chemicals would be required. Any photographic chemist or dealer would supply you with reliable materials. The book can, of course, be obtained from any bookseller.—D.

Camera.—PHOTO.—Any photographic material dealer will supply your wants. A camera for ferrotypes would be fitted with what is termed a wet plate dark slide. The size is quarter plate, and the price varies, according to the quality, from 30s. upwards. A second-hand one could be bought at very much less. We do not make a custom of recommending any particular firms. The advertisement sheets of any photographic publication contain numerous addresses where all you require is supplied.—D.

Telescope.—W. M. (*Honiton*).—You will find very considerable difficulty in making a telescope "about 6 in. when closed"—that is, if you mean one having three or four draw-tubes. The difficulty would lie, not in the selection and arrangement of the lenses, but in the lathe-work connected with the tubes. I think I am right in assuming that you have not a lathe, but even if you have one, and can use it, you will learn more of the tube making and fitting by five minutes' examination of an ordinary pocket telescope than you would gain from a column of detailed instructions here. You say, "I do not want to make an expensive telescope; I want to see a good distance, and to be able to say that I made it myself." The latter is a very commendable desire, and you had, perhaps, best start to satisfy it by trying to make the least expensive and most simple form of all telescopes, the only form of instrument which, without sliding tubes, can be contained in 6 in. This form is called the "Galilean telescope." For its construction you will want two lenses. A plano-convex, say, 1⅛ in. in diameter



Telescope.—A, Object Glass; B, Eye Glass; C, C, Tube (Brass or Paper); D, D, Disc of Wood bored to take the Small Sliding Eye Tube, E, E.

and 6 in. in focus (the object glass), and a plano-concave, say, ½ in. in focal length. These should be arranged as in diagram: the one at a distance of about 6 in. from the other. The magnifying power will be 12, and is found by dividing the focal length of the object glass by the focal length of the eye glass—that is, $\frac{6}{\frac{1}{2}} = 6 \times 2 = 12$. You can increase the power either by obtaining an object glass of greater, or an eye glass of less, focal length. The cost of the two lenses necessary should not be more than a couple of shillings, if you use the common lenses. Of course, if you get achromatic lenses you will have to pay more. Your letter is in very general terms; and that is why I cannot definitely answer you. Will those readers of WORK who send telescope queries remember that the more information they give me the better information I can give them? They need not be afraid of making their letters too long.—E. A. F.

Bending Brass Treads.—P. D. (*Liverpool*).—I am not aware of any machine made specially for bending these step plates, or treads, as they are termed in the trade, but I can tell you a very simple way to do it, without anything but home-made appliances. Supposing that you have a bench with its front edge quite flat and true; then get a piece of wood cut out the thickness of the step that the plates are for, have one edge of it rounded off to what you want, and let it be about 3 in. longer than you want the treads to be. Bore two ½ in. holes an inch from each end, and screw it to the bench with two coach screws; bore two

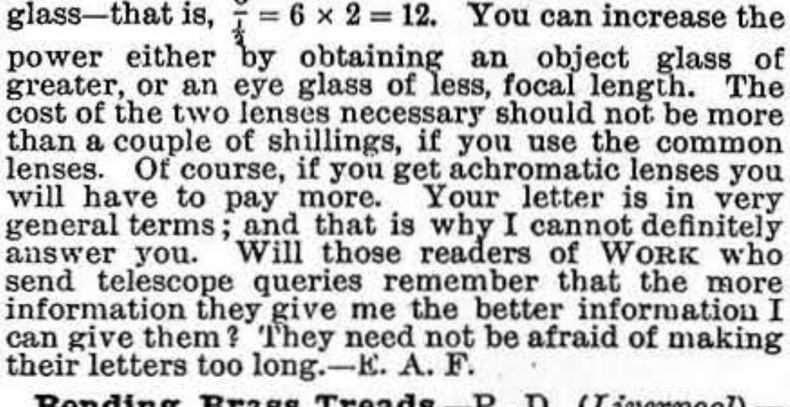


Fig. 1. Fig. 2.

Bending Brass Treads. Fig. 1.—Section of Arrangement for bending Brass Plates. Fig. 2.—Showing Plate bent.

smaller holes an inch away from the bolt-holes, and tack into the bench two wire nails for the brass to rest on as you slip it between the block of wood and the bench. These must be adjusted so as to give the right amount of turn under to the tread. The *modus operandi* will then be as follows:—Slip a plate of brass between the block and the bench; screw the coach screws tight, and bend down with both hands; undo the screws and take out. Half a turn of the screws will be sufficient to tighten and loosen the plates, and I think you will find it answer very well. Figs. 1 and 2 will still more plainly show what I mean. Of course, this will not remove dents; but I think you will find it a saving of time against the rollers, besides getting every plate exactly alike.—R. A.

Patent.—J. K.—I do not see anything in this to sustain a patent, nor do I think it would be upheld on a trial. There are some disadvantages. For instance, I do not see what is to hinder the sewer gas from flowing out through fresh air inlet. Also, should any pressure occur, the gas will be forced into the houses sooner than into the street.—F. C.

Fret-saw for Lathe.—S. P. (*Penarth*).—Where can you and your friends have lived if they don't know of the numerous "rigs" for fret-sawing on the lathe? You don't say whether you wish to buy or make one. You can buy one from the Britannia Company, Colchester, but it is an easy thing to make, and can be done in many different ways. I think your first step might be to get some of the catalogues published by dealers in fretwork materials, as besides the prices you would see many illustrations of tools, etc., from which you could gain new ideas. For instance, write to Messrs. Harger, of Settle, Yorks, sending six stamps; or to Messrs. Churchill, Cross Street, Finsbury, E.C., and enclose twelve stamps; you will get a delightful picture-book, richly worth the money, containing hundreds of illustrations of new American tools, etc. You can certainly utilise your brass face-plate by screwing a ¼ in. steel pin into it about ½ in. from the centre to drive the lower arm of the saw; but take a good look round first, and see what others have done, is the advice of F. A. M.

Paint or Enamel.—ANCONA.—There is no article of the above nature that will resist the continual action of soap or similar alkaline natures. "Bath varnish," which is specially made for re-painting, etc., insides of house-baths, is the most durable article you can use, without, as you remark, the firing process. If you use this for finishing your painting on tin surface, mix your paint itself with three parts of turps to one of bath varnish only—no oil or other driers—and then, when finished, leave it to harden as long as possible. For using on grained work, get "fine copal oak varnish." This will do for all ordinary purposes, excepting floors or furniture that is *sat upon*, for which "hard-drying" or "church oak" is required. Varnish should never be tampered with, especially by the novice. Adding oil will ruin it.—F. P.

Dry Point Work.—J. H. (*Bacup*).—The process alluded to in the photographic advertisement you sent, and which is termed "dry point work," is a method of working up enlargements. It is done by a needle-point brush, and consists of fine dots. There is one apostle, though I forget his name, who turns out splendid work, but he stands alone. The others are not, as a rule, very good hands.—F. P.

Medium for Tile Painting.—KILN BURNER.—"Fat oil" of turpentine is the most serviceable and least expensive of the various mediums used for china and tile painting. Other oils, possessing naturally the same qualities as the above product, are oil of aniseed, oil of tar, and oil of lavender. These necessary qualities are: First, that the medium should not "set" until sufficient time for manipulating the colour is given; secondly, that they shall be of a nature such as the firing process can properly carry away or disperse. The greater portion of tile painting—treating the art from the unprofessional aspect—is executed upon china or *glazed* tiles, and not upon "biscuit," as you desire. With the former, the firing can be done without much risk or trouble; but when it comes to *glazing* and firing the painting, you will agree that the process requires the convenience of a pottery works. The district from which you write suggests that you are able to command this latter aid, and as I presume you have some object in painting on "biscuit" direct, I therefore aid you as far as I can. Now, respecting the "tube colours," are they made for the purpose?—viz., kiln work. If not, then don't suppose you will do any good with them, since only such pigments as are *chemically* adapted for firing must be used. Assuming they are the right pigments, "fat oil" cannot be bettered, so far as I am aware, for the medium. Fat oil of turpentine can be made by exposing a little ordinary commercial oil of turpentine ("turps") in an open vessel and to an atmosphere both warm and dry. The fatness arises from the bulk of the "volatile" element or "spirit" evaporating, and leaving behind the resinous part of its nature. A table-spoonful may be exposed in a saucer—as in such a vessel it is largely exposed to the oxidising action of the air—until it thickens and diffuses itself all over the vessel. If the latter is stood in a second saucer, nothing is wasted, and there is least "mess." When once "fattiness" is obtained, the property is readily communicated to the fresh turps added thereto as the former is gradually required. Fresh turps is used to thin and spread the colour with after the pigment has been worked into a stiff paste with fat oil alone. Tile painting may also be done in water-colour by adding a little dissolved sugar to the *dry* prepared colours, using just sufficient to prevent the work from dusting off. Tile and china painting is not, as you are doubtless aware, a matter within the province of "Shop" to more than touch upon. It is an art, a difficult professional art, requiring knowledge of chemical properties as well as artistic ability and experience. I fancy it is your tube colours that are all wrong in chemical nature.—LONDON DECORATOR.

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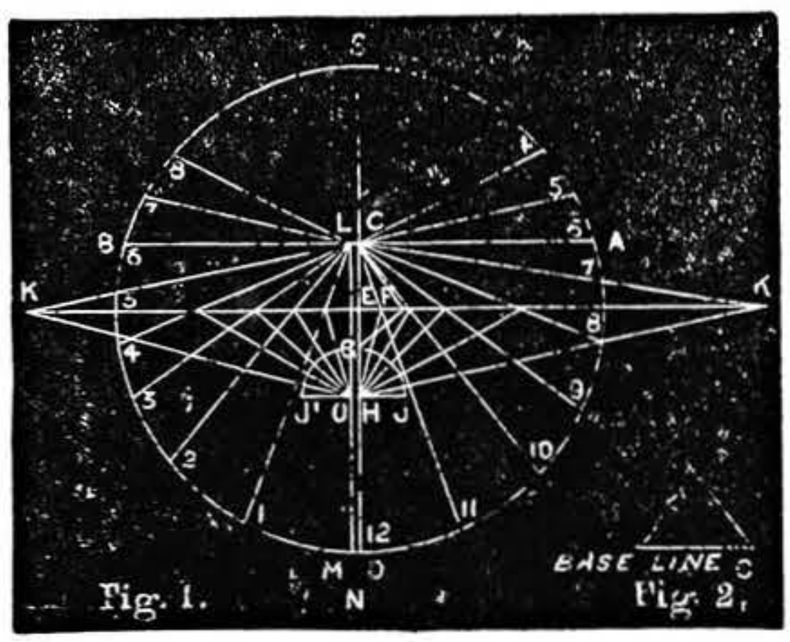
Printing on Tin.—CURIOUS.—A reply was given to this query in quite an early number of WORK, recommending the querist to inspect the various patent specifications relating to the decoration of tin plates; but it has occurred to the writer that every town does not present the same facilities for search as the one in which the writer is at present residing: he, therefore, gives an extract from the complete specifications, Nos. 13738 and 14321, 1887 (No. 14321 was completed 1st February, 1888), of a Mr. Rees, "for decorating or printing tin plates and other sheets," as follows:—"The object of my invention is to produce a simple and very efficient means for, and method of, decorating or printing on tin plates and other sheets, which shall have many excellences over the usual methods, especially in the results obtained and in the speed and economy of material and labour with which the operation is effected. In the ordinary methods of decorating and printing on tin plates and other sheets, as at the present system usually employed, the following evils are generally experienced: In the direct system the two hard surfaces of the tin plate or sheet and the stone or other printing block are brought into direct contact, whereby one or the other is very quickly damaged, and therefore, although this is the speediest method, the expense caused by this injury is so great that the most common method is the transfer system. In the transfer system, on the other hand, the impression is oftentimes spoilt by the necessary subsequent operation of removing the paper or other transferring material, which also is wasted after being once used, and fresh paper or material has to be prepared for each impression, whereby also increased expense is incurred; and when this system is employed, the tin plate or sheet has to be coated with a film of transfer varnish, by which the lustre of the tin plate is diminished. By this invention these and other evils are obviated and removed, and the operation is, or may be, effected as quickly as by the direct system, without injury to the tin plate or sheet and the stone or block, while the increased labour and expense of the transfer system are saved, the results are improved, and there is no danger that the impression will afterwards be spoilt in the manner as aforesaid. To carry out this object, and to perform my invention, I take a piece of millboard, cardboard, or other similar material, preferably a hard-rolled and glazed millboard, or it may be a metal or wooden plate, of the required size and shape for the tin plate that is to be decorated or printed; and when made of millboard or other material that requires treatment to render it waterproof, I rub the same with hydrocarbon oil, which, if required, may hold in solution paraffin wax or other similar substance; and on the board or plate before mentioned I secure a piece of varnished cloth or canvas, or vellum, or parchment, or skin, or other material having an impervious surface, preferably leather cloth or oil baize, which covers the board or plate either wholly or in part, in accordance with the design, pattern, or lettering to be printed, and the surface of this material is then, in any convenient manner, made perfectly smooth and level, and is treated with hydrocarbon oil or turpentine, or a mixture of the same, in such wise that a thin film covers the entire surface of the material, or so much of the same as will receive the design or pattern or lettering, the surplus oil or turpentine or mixture, if any, being removed. The required design, pattern, or lettering is created in the usual manner upon a stone or metal plate, or on a wood block or other ordinary material, and is inked over as is customary, and the aforesaid prepared surface of the board or plate is pressed thereon in any usual manner, taking off the impression. The so-treated surface of the board or plate is then similarly pressed on the surface of the tin plate or other sheet that is to be decorated, and the design, pattern, or lettering is properly imprinted thereon, being taken off the prepared surface of the board or plate, which is then lightly rubbed over with fresh hydrocarbon oil or turpentine or a mixture of both to ensure that the aforesaid film is duly in position, and is ready to take another impression from the stone or other printing block, which, if required, has again to be inked, and to transfer this impression in the same manner to the same or to another tin plate or other sheet. To save time and labour and expense in thus decorating or printing on the tin plates or other sheets, I preferably form the prepared surface as before described on both sides of the board or plate, and when one of these surfaces has been pressed as aforesaid, and the stone or other printing block having (if required) been again inked, the other prepared surface of the board or plate is pressed thereto, and the tin plate or other sheet is placed on the treated surface of the board or plate, and on pressure being applied in any usual manner the tin plate is properly decorated or printed or lettered as before described, while at the same time the other prepared surface of the board or plate receives the impression from the stone or other printing block. The tin plate or other sheet is then removed; this so-exposed prepared surface of the board or plate is treated as before described with fresh hydrocarbon oil, or turpentine, or a mixture of the same, and the board or plate is again reversed in position on the stone or other printing block, and the aforesaid procedure is repeated, and so on. In the same manner two or more colours can be worked into the same design or pattern or lettering, in, and by, the usual course of procedure, care, of course, being taken that the several parts are always placed in the same positions in respect of each other by using any of the ordinary registering appliances. It is obvious that this invention can be used and performed as before described, in any of the usual machines, such, for example, as the ordinary hand-working lithographic press, or the ordinary lithographic machine with cylinders or rollers, or otherwise."—N. M.

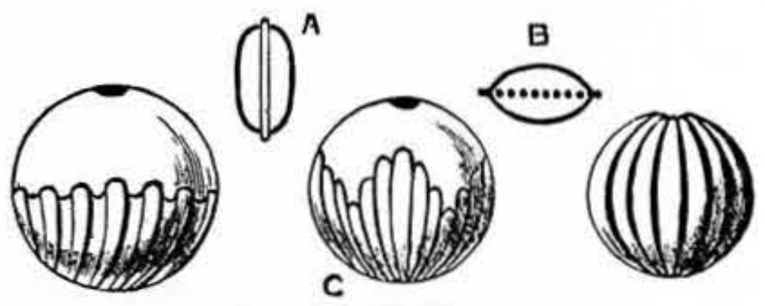
Sundial.—TIMA asks for a method of calculating the various angles of the hour lines with the meridian line for a sundial lat. N. 53° 36'. Also whether the same angles are gone over in each hour in all seasons. I will answer the last question first. There are but four days in the year when the sun casts its shadow correct with a good clock. The sun as a timekeeper is exceedingly irregular, though its irregularities are absolutely regular. This arises from the fact that the earth's equator is not coincident with the plane of its orbit round the sun. Any almanac will give clock fast or slow with the sun to show correct time. Suppose the almanac shows clock fast 15', then when the shadow of the style falls, say, on the four o'clock line, the true time is 4.15, and so on. First of all, we must make our gnomon. The elevation of the



Sundial.

gnomon must be of the same angle as the latitude of the place for which it is intended—that is to say, the edge which casts the shadow must be coincident with the polar axis of the earth. To mark off the angles, draw a straight line, C D; perpendicular to this draw A B. Draw an angle, E C F, equal to the latitude of the place, 53° 36'. Cut this angle by the line K K—the precise position is of no consequence—and make the same angle, E F G. Measure the distance from E to F, and mark off the same from G to H. Place the point of the compass at H, and strike a quadrant from G to J. Divide the distance from G to J into six equal parts. From the point H draw lines cutting those divisions on to the line K K. Now from the point C draw lines to cut through K, intersecting the lines previously made. Line A is six o'clock, K is seven, and so on to eleven, the line C D being noon. Measure the exact thickness of the gnomon, and equal to that draw the line L M, and from that lines corresponding to those already made must be drawn. Carry the lines seven and eight a.m. through the centre, and we shall have our seven and eight hours p.m., and carry the five and four p.m. lines through the centre, and we shall get the five and four a.m. lines. The point of the gnomon, C, Fig. 2, must be placed at C on the lines L and C. If TIMA does not know how to find the angle of the gnomon, or the true meridian of the place where he intends his dial to be fixed, I shall be happy to give him the needed information. —O. B.

Squat Ball Making.—NO NAME.—I am sorry your inquiry respecting mill, etc., was delayed. The weight of the mill is 150 lbs., and 20 in. in diameter. I would have sent working drawing, but as the mill is the only one in use, as far as I am aware, it will become the subject of a patent. The delay has been caused by my desire to find a manufacturer of fancy balls in Birmingham, as I understood they were made there; but I have not found one. In Sheffield, Messrs. Tucker and Sons, York Street; Messrs. W. Gallimore and Co., and Messrs. J. J. Maxfields, Arundell Street; Messrs. Pearson and Co., and Messrs. Oates and Co., Rockingham Street,



Squat Ball Shapes.

are agents for them. The fancy balls are made almost round, and then put into a hydraulic press, under dies which, having the flutes or ornamental parts cut in them, are forced into the balls to form the ornaments as shown at C. The squat balls and balls with flanges are made the same way as round ones. To make this shape, edges are not trimmed off, but pressed in two halves and soldered, as at A. These edges are used for turning a bead on the ball as shown at B. The balls are manufactured chiefly in France and the United States of America. The cost of the machines varies from £100 to £300: they are made by Messrs. Bliss & Co., Brooklyn, New York.—B. W. R.

Marbling.—HAMMER-CHEWER.—If you can afford about a couple of guineas for six good hand-painted specimens, write Mr. W. G. Sutherland, 15, St. Ann Street, Manchester, and mention WORK as your source of advice.—LONDON DECORATOR.

Patterns for Turning.—A. H. J. (*Norwich*).—Mr. Fritz Collins, Summerhays Place, Bath, did supply, and probably still supplies, sheets of patterns for this purpose; but I cannot, of course, say whether they would be such as would suit your taste.—M. M.

Hot-air Engine.—J. R. (*Liverpool*).—It would probably take too much room to give directions for making a hot-air engine in the "Shop" columns, but you can get information on the subject in Nos. 1,154, 1,156, 1,088, of the *English Mechanic*. The first contains a drawing by Mr. Seal, which was followed, but failed to work well owing, I think, to the air displaced being too small in comparison with the working cylinder; I think the displacer should move through three or four times the cubic inches that the working piston does. The last number, 1,088, contains a section of Robinson's hot-air engine.—F. A. M.

Wimshurst Machine.—W. A. (*Bury St. Edmunds*).—(1) Thin sheet brass will serve equally as well as, if not better than, tinfoil for the sectors of a Wimshurst machine. They need not be lacquered. (2) The brass wire used in making scratch-brushes would be much too rough for the collector brushes, and would, as you say, scratch the sectors and render them useless. The best material for brushes is "yellow warp twist," sold by lacemen at about 8s. or 9s. per lb. This is made of fine electro-brassed copper wire, flattened to form a ribbon, and twisted around a thread of cotton, ther several of these threads are twisted together to form a loose cord. A small bunch of these cords forms an excellent brush for a Wimshurst machine. If you experience any difficulty in getting this material, write to Messrs. Bonney & Co., 19, Avenue Road, Lowisham, S.E. They are connected with the trade, and will get you the twist at a reasonable cost.—G. E. B.

Polishing Bullocks' Horns.—J. M. (*Sutton-on-Hull*).—If they are at all rough, the roughness must be got rid of by rubbing with rather fine glass-paper, and then by scraping with a sharp steel tool, such as a razor, or else with a piece of glass. The actual polishing is done after this by some cutting powder—such as Trent sand and water or powdered pumice and water—applied by means of cloths, until quite a smooth, regular surface is obtained. After removing all particles of this coarse powder, we next try a finer one, such as powdered charcoal or very fine brickdust; both of these with water, and on some pad or bob made of cloth, to allow of a great amount of friction being used with them. To finish and obtain a bright surface, the horns should be washed quite clean; and then washed chalk or very fine whiting can be applied, as before, on a cloth pad. This can be moistened advantageously with some very weak acid—vinegar will do—and a final finish can be given with some dry whiting applied by the palm of the hand. It is not the materials so much as the friction that is essential in obtaining a good polish.—H. S. G.

Combined Knife and Spoon.—J. H. (*Uxbridge*).—We cannot advertise your article in WORK free of cost. You must be prepared to pay for gaining publicity for your invention. If it is a good thing you would do well to consider the patenting of it.

Kaleidoscope.—R. W. I. L. (*Gawler, South Australia*).—I have forwarded a second letter (registered) to your address, seeing that the first had failed to reach you.—T. R.

Sauce.—ONE IN A FIX.—Questions concerning sauces, pickles, or condiments, do not come within the scope of WORK. You cannot do better than refer your question to the Editor of *Cassell's Saturday Journal*.

Applied Mechanics.—R. R. (*Dumbarton*).—You cannot do better than purchase "Applied Mechanics," by Sir R. S. Ball (Cassell & Co., London, E.C.), price 2s.

Ebony Stain.—A. C. (*Leicester*).—Your query has been fully answered since your letter was written, under "Ebony Stain," in "Shop," p. 332, No. 125, which please read.—LIFEBOAT.

French Polish.—T. F. (*Willington on-Tyne*).—As regards your sideboard, we can only surmise that you wished to stain it in imitation of walnut; or why use vandyke brown? for in getting it nearly black you must have been very lavish in its use. A too lavish use of stains generally gives to the articles thus treated a painted rather than a stained appearance. It is always best, in staining, to build up the colour gradually. Two coats of weak stain will be found far better than one strong coat; and it is always better to try their effects on odd pieces of wood previous to using on the finished article. Had this precaution been taken, it would have saved you much trouble, for we regret to say it will *not* be possible to make your sideboard lighter coloured without removing the varnish. Which kind you used, by the way, you did not tell

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us. For hints "How to remove French polish or varnish," please refer to "Shop," p. 188, No. 116. If, however, you decide to make the best of a bad job, the varnish can be French polished on if the precaution be taken to make it smooth with fine glass-paper, taking care not to rub the stain off the sharp edges when working on the carvings and mouldings. If, when "bodying up," you still find the colour hold out dark, you may give to the whole a richer appearance by using red polish, made by adding a few drops of red stain—which is made by dissolving two-pennyworth of bismarck brown in a quarter of a pint of methylated spirits. Your sideboard, if made true to the design, would look remarkably well thus finished. It may be that you have been misled by these so-called browns. Bismarck brown gives a rich red colour, while, as you know, vandyke varies from brown to nearly black. We hope these hints will be of use to you, and help you out of your difficulty. If not, write again.—LIFEBOAT.

Tools.—GRANITE.—Both S. J. Addis and J. B. Addis & Sons are known as makers of *first-rate* carvers' tools. Unless GRANITE wishes to buy in large quantities, it will be better to get the tools through the nearest tool dealer, any of whom will supply Addis's tools. Nurse & Co., who advertise in WORK, publish a catalogue which contains a list of carving tools, tabulated as Addis's tools are numbered. Melhuish also does the same. As to the other maker, GRANITE will perceive that these answers should be so framed as to benefit other readers as well as the querist, and should not depreciate any tool maker in comparison with others. That being so, I can only say that I have not chanced to try any gouges by Greaves, but that I have had chisels and plane irons by that maker, and that they have been of excellent quality.—B. A. B.

Organ Pipes.—E. A. P. (*Beckenham*).—It has already been pointed out (col. 1, p. 382, No. 128) that the statement that the 16 ft. tone can be obtained from a 4 ft. pipe is a slip. You can reduce the height of your organ in several ways: (1) by planting some of the largest pipes on the floor; (2) by

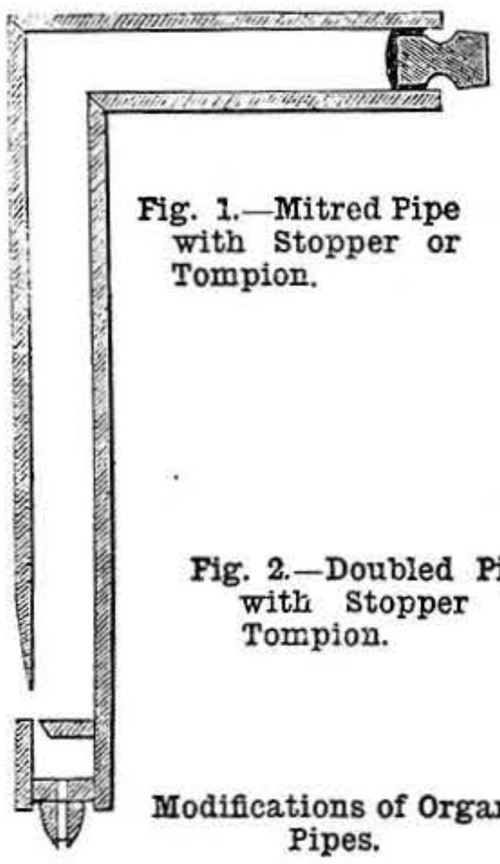

Fig. 1.—Mitred Pipe with Stopper or Tompion.

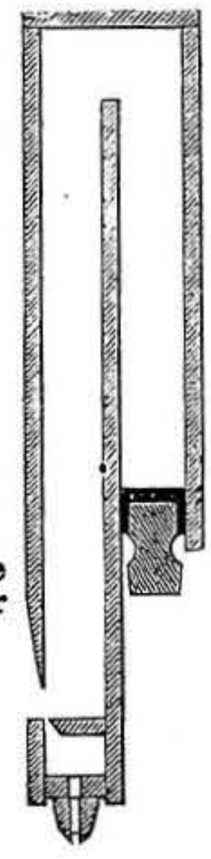

Fig. 2.—Doubled Pipe with Stopper or Tompion.

Modifications of Organ Pipes.

laying them horizontally at the back of the instrument; (3) by mitreing some of the largest pipes; or (4) by doubling them. I annex a sketch showing the last two items. So long as you obtain the length and diameters of the pipe, it does not matter whether the pipe is straight or not. Indeed, bourdon pipes are often improved by being mitred. Both open and stopped pipes can be treated in these ways for the purpose of reducing their height.—M. W.

Machines for Blowing Organs.—J. A. G. (*Southport*).—There are motors made to work by electricity, and others by gas; but I am unable to state the initial cost or the cost per hour of working. Inquire of the small engine makers in the London Directory.—M. W.

Bicycle Chains.—H. H. C. (*Yeovil*).—I am not aware of any chain being made small enough for a model tricycle. Information on the subject can be had of the following firms (chain makers): Brown Bros., 7, Great Eastern Street, London, E.C.; Perry and Co., Limited, Birmingham; F. Brampton & Co., Oliver Street, Birmingham. If H. H. C. can make a model tricycle, it should not be difficult to make the chain any size he wants. He has only to make a punch in the shape of each link, to cut the links from a bit of sheet brass, then get a bit of very fine brass tube, say, ⅛ in. out, and cut in lengths for the rollers.—A. S. P.

Safety Bicycle.—CYCLE.—(1) Messrs. Cassell and Co. will supply back numbers of WORK, containing cycle-building papers, four of which are now published. (2) W.S. tubes in large quantities from Herbert & Hubbard, Coventry, and Credenday (tube makers), Birmingham. Tubes, small quantity cut to length, of St. George's Cycle Co., Upper Street, Islington, London; Brown Brothers, 7, Great Eastern Street; and others. (3) The best enamel I know of to put on with a brush without stoving is the club black, hard-drying enamel, sold in all cycle shops in 1s. bottles; got in large quantity of the Silver Enamel Co., 97, Hampstead Road, London.—A. S. P.

Boiler Feed.—INNEK.—In place of a force pump an overhead boiler feed may be used, but the tank must be at a sufficient height to resist the pressure of steam, which would otherwise drive the water out of the boiler up into the tank. To find the necessary height of tank in feet above the boiler, multiply the gauge pressure of steam in pounds per square inch by 2⅓. Thus, if you have fifteen pounds pressure in the boiler, the feed tank must be 15 × 2⅓ = 35 ft. above it. You may, instead, feed your boiler by a small injector. These are now sold by model makers.—F. C.

III.—QUESTIONS SUBMITTED TO CORRESPONDENTS.

Stick Handles.—APPRENTICE writes:—"Will anyone give me information on the mixture of imitation silver for making stick handles? the cost of same, etc., being a consideration."

Black Varnish.—T. L. (*Chew Magna*) writes:—"Will any reader of WORK kindly inform CARADOC the ingredients used, and their proper quantities, for making black varnish suitable for ironwork, etc.?"

Inlaid Oval Table Top.—A. E. (*Wandsworth*) writes:—"I have a mahogany table (round) diameter 2 ft. 9 in. I want to make a movable *deal oval shape top* for same, and would be glad of any advice in 'Shop,' particularly about the thickness of wood, how to find dimensions, joining, fixing the top easily and firmly, also what the exact length of the oval would be if the narrowest part is 3 ft. 6 in. Would one of the exhibitors of inlaid tables at the recent WORK Exhibition kindly give me instructions how to inlay the table top? Every time I visited the Exhibition I spent some time in admiring and examining the work both of prize and non-prize winners, but failed to find out how the wood was cut so even, and fixed in so true. I should also be glad of a list of suitable woods, thickness, and the best place to obtain them. Should I begin to inlay work in the centre or outside? A design would be acceptable."

Metal Plate Book.—SHEET IRON writes:—"In No. 58 of WORK, page 94, ALIQUANDO mentions a book on metal plate work, by C. T. Millis; would he kindly give price and where published?"

Bamboo Work.—E. C. W. (*London, E.C.*) writes:—"I should like to be informed where I could obtain small quantities of lacquered panels for bamboo work; also buttons for the ends of cane. I should also like to know whether there is a book published on bamboo work."

IV.—QUESTIONS ANSWERED BY CORRESPONDENTS.

Lubricating Oil.—PETER writes, in reply to F. F. M. (*Edinburgh*):—"The following is a recipe for lubricating oil for bicycles. Use one-fourth of paraffin oil to neatsfoot oil. It will work all right. Just shake up before oiling machine. I use it for my own machine."

Mandrel for Lathes.—H. F. (*Stratford, E.*) writes:—"I do not know what size mandrel J. T. (*Walworth*) (see page 159, Vol. II.) requires, but I suppose it is not larger than one I had made some time ago, for a 4 in. heavy metal-turning lathe, and it only cost me 15s., and was hardened cast steel. I can recommend the firm as being very moderate in their charges, and workmanship and materials A 1. The address is: Price's Manufacturing Co., 24, Randall's Market, Poplar, E."

Wood Pulp.—J. W. G. (*Redhill*) writes, in reply to ÆON (see page 538, Vol. II.):—"There is the Wood Pulp Company, Thetford, who make all kinds of hollow ware of the above kind."

Punt.—W. H. M. (*Preston*) writes, in reply to W. P. (*Cardiff*) (see page 634, Vol. II.):—"Does this correspondent require information as to making a dinghey or yacht's punt, or does he refer to a Thames punt? In either case I shall be glad to assist him on hearing further."

Mining Engineering.—M. (*Bishop Auckland*) writes, in reply to S. H. M. (*Liverpool*) (see page 334, No. 125):—"You should, about the age of seventeen, be articled to a mining engineer in practice for four years, and at or near the end of the term go in for the examinations which are held in various towns. You will have to pay a premium, and will not receive any pay during the time you are serving your articles. You can go in for one branch of mining only, but it is better to know all. If you had given more definite particulars, I would have been better able to advise you."

V.—BRIEF ACKNOWLEDGMENTS.

Questions have been received from the following correspondents, and answers only await space in SHOP, upon which there is great pressure:—W. B. (*York*); T. S. (*Liverpool*); J. H. (*York*); G. F. C. (*Hastings*); RUNNER; J. S. A. (*Lancashire*); BRIEF; M. P. B. (*Finsbury*); T. B. (*Islington, N.*); R. M. (*Glasgow*); CONSTANT READER OF "WORK:" J. P. (*Hollinwood*); T. W. (*Kendal*); J. H. (*Glasgow*); J. G. (*Glasgow*); ROB ROY; H. W. (*Southampton*); CYMRO; H. F. (*Rye*); M. N. (*Roehampton*); H. T. H. P. (*Hull*); C. V. (*Bath*); T. & E. (*Blackburn*); A. R. (*Manor Park*); CHARLES; G. W. (*Bournemouth*); H. L. G. (*Edinburgh*); TELYN; A. B. (*Renton*); M. D. C. (*Liverpool*); GUARD; F. M. (*Wotton*); AXLE; H. S. A. (*Wolverhampton*); W. R. (*Cressington*); J. R. M. (*Liverpool*); J. R. (*Skerries*); F. T. (*Liverpool*); SOLDER; F. R. (*Sunderland*); F. S. (*Harlesden, N.W.*); J. M. (*Liverpool*); T. C. C. S. (*Liverpool*); J. T. (*Biggleswade*); J. W. C. (*Tavistock*); H. J. M. (*Bristol*); BUTTON; E. S. F. (*Charlton*); R. F. (*Newcastle*); M. P. B.; HARROWGATE; LIGHT; J. D. (*Hull*); E. J. T. (*Lancaster*); W. W. (*Manchester*); J. M. (*Parkstone*); H. (*Tunbridge*); T. M. (*Walton-on-Thames*); D. B. B. (*Glasgow*); S. C. (*Ashton-under-Lyne*); H. H. (*Ashbourne*); C. F. (*South Shields*); C. L. H. (*Reading*); A. T. (*Burnley*).

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